Co-ordination of care for the complex medically ill

Latour, C.H.M.

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CO-ORDINATION OF CARE FOR THE COMPLEX MEDICALLY ILL

CORINE H.M. LATOUR

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CO-ORDINATION OF CARE FOR THE COMPLEX MEDICALLY ILL

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CONTENTS

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General introduction

It was only a few decades ago that health care was conceived as simple and well-organised. A patient was treated by a single doctor, and a nurse could focus on a series of single tasks. Over the course of time things have changed in health care. One major aspect of current health care is that our society is ageing. For instance, the average life expectancy in the Netherlands is increasing (81 for women and 76 for men). Another aspect is the development of medical technology, resulting in more effective treatment. For instance, the mortality rate for cardiovascular diseases in the Netherlands has decreased dramatically (a decrease of 17.4% between 1993 and 2004). This also applies to HIV (a decrease of 74.2% between 1996 and 2004), and insulin dependent diabetes mellitus (a decrease of 15.2% between 1996 and 2004).[1] These are no longer diseases a person will, as a matter of course, die from. But dying at an advanced age, does not automatically lead to a proportional increase in the number of years in good health. On the contrary, over 40% of our aging population in the Netherlands consider their own health to be moderate or poor, the main causes for which are chronic diseases and psychiatric disorders.[2] It is to be expected that between 2005 and 2015 the number of people with one or more chronic diseases will increase by 25-60%.[1] A report publishes by the Municipal Health Service (GGD) in 2006 states that elderly people (55+) with two or more chronic diseases, or with a poor subjective health perception, have an increased risk of developing psychiatric diseases such as depression.[3] The combination of physical and psychosocial problems results in an increasing need for health care facilities.[3]

Taking these developments into account, our health care system is confronted with a growing group of complex medical patients; patients with acute or chronic medical, neurological, obstetrical or surgical condition(s), combined with psychiatric co-morbidity, or patients with unexplained physical complaints, functional disorders, complex behaviour, or organic psychiatric disorders that are the direct consequence of one or more primary medical condition.[4] For example, a patient on haemodialysis, who is depressed and does not comply with the treatment or a patient with liver cirrhoses who has an alcohol addiction and is also confused.

The historically build-up of silos of health care, general health care versus psychiatric health care, primary health care versus secondary health care, have resulted in an increase in co-ordination and communication problems for these complex medically ill patients. What has been the response of the health care

system, with regard to the 'simple' organisation of the care that was provided decades ago and the rapid developments described above?

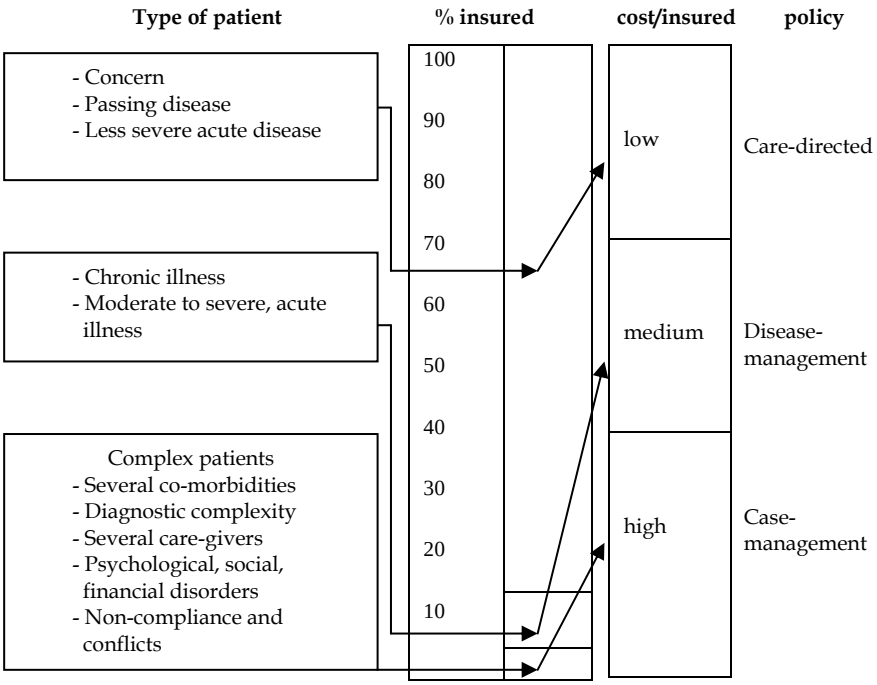
A growing number of medical and nursing sub-specialisations have been developed, resulting in a variety of disease management programmes.[5-7] It has been suggested that disease management programmes are most appropriate for well-known diseases which can be treated according to evidence-based protocols. Patients with diabetes mellitus, hart-failure or chronic obstructive pulmonary disease are typical candidates for disease management programmes.[8] Weingarten et al. gave the following definition: "An intervention designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple treatment modalities".[9] Prevention by screening, education and monitoring are other key components. By definition, these programmes do not take into account the fact that a number of patients with a chronic condition are suffering from a combination of physical and psychiatric diseases. This also applies to patients whose physical treatment is complicated by their psychological functioning, low compliance or substance abuse, and to patients with unexplained physical complaints.[10] This relatively small group utilises a great deal of the health care resources. (Figure 1)[11;12] Approximately 3-5% of the people who are insured are responsible for approximately 33% of the total costs.

During the past two decades it has become clear that in general health care disease management programmes alone will not fulfil the needs of patients with multi-morbid complaints. Communication and organisation problems have arisen because these complex medically ill patients did not fit into the disease-specific protocols. A theoretical concept of an interdisciplinary medicine (INTERMED) instrument was developed to assess biopsychosocial case-complexity and care needs.[13] However this instrument has not yet been applied in an intervention study.

The term 'case management' was first used in community health care in the 1950s,[14] and it is only in the past two decades that this term has been cautiously introduced in general health care. The major components of case management are: assessment of care needs, development of integral treatment plans, improvement of access to (psychosocial) care, and monitoring the quality of the care that is provided.[15]

But how do we detect these complex medically ill patients in daily practice, and how can we provide the most appropriate treatment?

Figure 1 *Type of patients and health care resources.*



The objectives of the study were to address the following research questions:

- Is the INTERMED a reliable instrument to assess a heterogeneous somatic population?
- Is there any evidence in the literature, of the effectiveness of case management for complex patients in general health care?
- How can health care professionals identify complex patients in general health care?
- Does co-ordination of the care that is provided for these complex patients have a positive effect on their health perception and care utilization?

Outlines:
Chapter 2 describes the type of problems that arise when dealing with complex patients in general health care. A case description provides insight into a systematic approach to identify complex patients who are in need of integrated care. It defines patient-oriented care, based on the integral needs of patients, and the role that the INTERMED instrument can play in the complex interactions between patient, doctor, nurse, consultants and medical infrastructure.

The INTERMED has been developed to assess biopsychosocial case complexity and care needs. However, in order to be appropriate to use in general health care, such an instrument must be reliable. In Chapter 3, the inter-rater reliability of the INTERMED was assessed by calculating the agreement of two independent raters, based on the same information, in a heterogeneous sample of inpatients and outpatients with somatic complaints.

Chapter 4 presents a systematic review of the available literature on the effectiveness of a post-discharge nurse-led case management programme for complex patients in general health care. We investigated the effects of case management on the number of re-admissions, the duration of hospital re-admissions, emergency department visits, functional status, quality of life and patient satisfaction.

Chapter 5 describes the effects of implementing psychiatric interventions by means of a stepped detection and treatment strategy, performed by a consultation liaison nurse, in terms of reducing the length of stay in hospital and improving quality of life on discharge. This cohort study focused on inpatients on a general internal ward.

The study presented in Chapter 6 is, in fact, a logical continuation of the research described in Chapter 5: a randomized controlled trial (RCT) to determine the impact of case management on outpatients discharged from hospital on the number of emergency re-admissions, the level of care utilization, quality of life and psychological functioning.

Chapter 7 evaluates the cost-effectiveness of case management for outpatients discharged from hospital, compared with usual care only. The economic evaluation was performed alongside the RCT described in Chapter 6. Direct costs were measured by means of cost diaries kept by the patients and information obtained from the patients' pharmacists.

In the General Discussion I will reflect on the main findings described in this thesis, and discuss the implications of the findings for clinical practice. Some recommendations are also made for future research on the co-ordination of care for complex medically ill patients. The thesis will be concluded with a summary.

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2

A method to provide integrated care for complex medically ill patients in daily nursing practice: the INTERMED

Corine HM Latour
Frits J Huyse
Rien de Vos
Wim Stalman

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ABSTRACT

Objective

To describe a systematic approach (the INTERMED method) to identify complex patients who are in need of integrated care, and its applicability in relation to the nursing process.

Background

In order to organise the provision of health care for patients with chronic diseases in the most efficient way, a growing number of medical and nursing sub-specialisations have been developed in recent decades. Topics of concern are: the care that is provided is not tailored to cope with the growing number of patients with more than one chronic disease; there is an increase in co-ordination problems in the care that is provided for this group of complex patients; the care that is provided for these complex and vulnerable patients is extremely fragmented.

Method

Based on a patient case-description in which co-morbidity, co-ordination of care and fragmentation of care are the actual problems, we demonstrate the ability of the INTERMED method to quantify, weigh and classify the complexity of problems. As such, the INTERMED is presented as a decision-support system, facilitated by visualisation of the level of risks, for multidisciplinary integrated teams with nurse co-ordinators.

Conclusion

Appropriate assessment of health risks resulting in co-ordinated care with effective communication, is vital for multi-morbid patients as well as for a shift in focus from disease-oriented care towards medical complexity and integrated care. The assessment of complexity should become a basic principle in the provision of care, but requires training, time, effort, and often expert psychiatric nursing skills, as well as adjustment of the organisation of care.

INTRODUCTION

Despite all the medical progress that has been achieved, for a growing number of complex patients our current health care is in need of adjustments. Health care suffers from fragmentation and a lack of clinical communication and this leads to poorly developed care processes, irrespective of the great efforts made by the health care providers. The problem, in general, is not unique to the European healthcare system, because in America the situation is similar. Complex patients can be found among acute or chronic medical, neurological, obstetrical or surgical condition(s), including patients with unexplained physical conditions, psychiatric co-morbidity and psychiatric disorders, which are the direct consequence of a primary medical condition(s) such as organic psychiatric disorders.[1] Examples are confused orthopedic patients, diabetic patients with a depressive disorder, and HIV patients with a drug addiction. When not addressed appropriately, the combination of psychiatric and physical co-morbidity has a deleterious effect on health outcomes and utilization of the health care resources.[2-7]

In the past ten years the INTERMED method has been developed to facilitate a systematic and integrated health risk and health need assessment to determine the level of complexity and the related need for integrated and co-ordinated care.[8] This method is currently applied in clinical practice in two university hospitals (an admission ward for internal medicine and a neurological ward) in the Netherlands and also in a national rehabilitation centre for traffic accidents in Switzerland. Based on a patient case-description, the aim of this article is to describe a systematic approach (the INTERMED method) to identify complex patients who are in need of integrated care, the method and its applicability in relation to the nursing process.

INTERMED METHOD

The INTERMED assesses multiple health risks and health needs by means of a semi-structured interview,(table 1) and measures the complexity of the care that is needed by a patient.[9-11]

Table 1 *Leading questions of the INTERMED interview*

-Now, first of all, I would like to better understand how you feel physically?
-I will tell you what I know about the reason for your admission and your current state. You should correct me when I am wrong.
-Now I would like to know how you felt emotionally during the last week?
-I would like to have some more information concerning physical illnesses and treatments in the past five years.
-Who have been the doctors who have been taking care for you in the last five years?
-Have you ever seen a psychiatrist in your life or have there been periods that you have been anxious, depressed or confused?
-Now who are the doctors, nurses, social workers or psychologists who you are currently seeing and who take care for you?
-Have there been issues with doctors during the last five years, which gave you a bad feeling to such an extent that it might interfere with your trust in doctors?
-I would like to know how you follow your doctor's recommendations. Are you a person who is generally speaking inclined to do what doctors say?
-Now I would like to change the subject and ask you how you currently live?
-Now I would like to know what kind of person you are. Generally speaking, are you an easygoing person?
-Now, coming to the end of the interview, I would like to ask you about your smoking and drinking habits and their relation to the current problems?
-Do you think we missed any pertinent information?
-I finally would like to know how you have experienced this interview? Do you think that this will be helpful information or did you think this was inappropriate?

It is based on the biopsychosocial model introduced by Engel.[12] Previous studies have demonstrated sufficient inter-rater reliability,[13] and a high correlation with indicators for case and care complexity in several somatic patient populations.[14-18] The INTERMED consists of a matrix with 4 dimensions: potential biological, psychological and social health risks or needs and the patient's relationship with the health care system. These are fitted on a time-axis: history, current status, and prognoses,(Table 2) each dimension consists of five variables, and each is rated on a 4-point scale, ranging from 0 to 3. A score of 0 indicates either no health risks or needs, and 3 indicates severe health risks or needs. At the same time, 0 = no action needed, 1 = watchful waiting, 2 = action needed and 3 = direct or intensive action needed.(table 3)

Table 2 *INTERMED vignette*

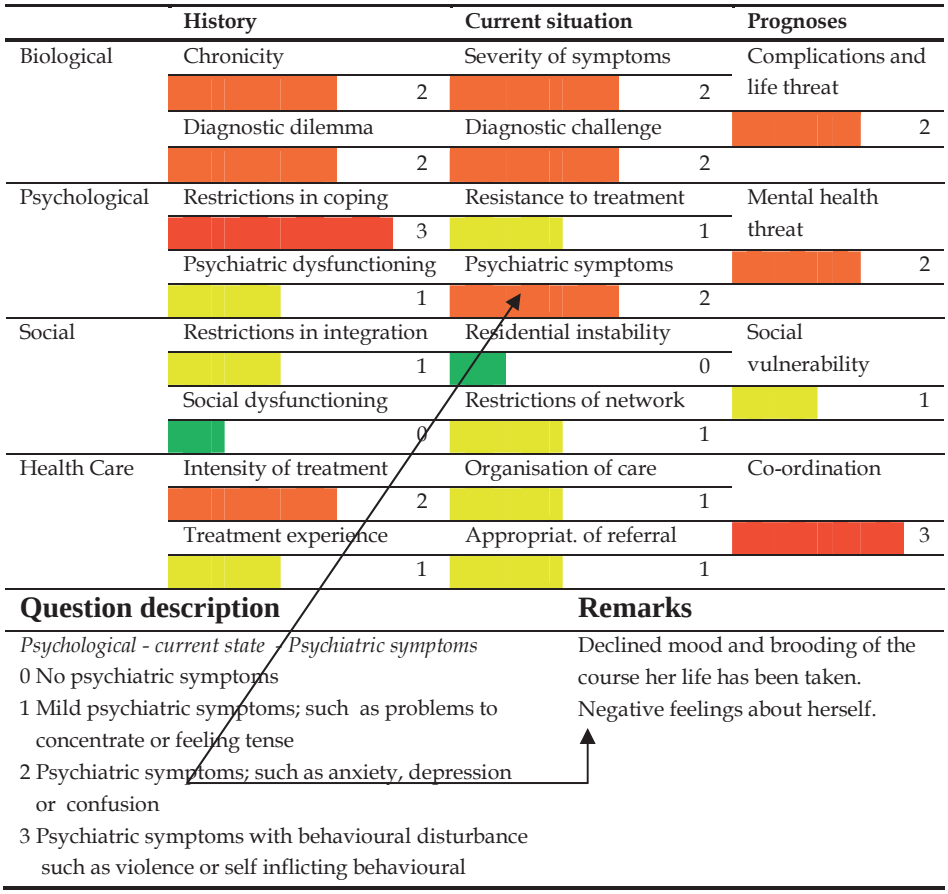
	History	Current situation	Prognoses
Biological	Chronicity Diagnostic dilemma	Severity of symptoms Diagnostic challenge	Complications and life threat
Psychological	Restrictions in coping Psychiatric dysfunctioning	Resistance to treatment Psychiatric symptoms	Mental health threat
Social	Restrictions in integration Social dysfunctioning	Residential instability Restrictions of network	Social vulnerability
Health Care	Intensity of treatment Treatment experience	Organisation of care Appropriateness of referral	Coordination

Table 3 *Score labels for INTERMED*

Num.	Visual	Score	Action
3	Red	Severe vulnerability or care needs	Immediate and/or intensive treatment
2	Orange	Moderate vulnerability or care needs	Treatment
1	Yellow	Mild vulnerability or care needs	Monitoring or preventive intervention
0	Green	No vulnerability or care needs	No action needed

The maximum total score is 60 points. All variables are clearly specified in a manual with defined clinical anchor points.[19] Patients with a score of more than 20 points can be considered as complex, indicating the need for some form of case management.[14] The virtue of the INTERMED is its systematic approach to the patient, and its ability to quantify, weigh and classify the complexity of problems by assessing the patient's vulnerabilities in terms of health risks and needs. As such, it is presented as a decision-support system, facilitated by visualisation of the risks in a grid, showing the need for action in the colours of traffic lights.

Figure 1 *Visualisation of the patients' vulnerabilities in terms of health risks and needs*



PATIENT CASE-DESCRIPTION

Reason for admission: A 27 year-old woman is admitted to a gastroenterology ward for the evaluation of diarrhoea. Her condition has deteriorated as she has lost about 10 kilos in the past month, and she has informed her doctor that she is almost incapable of doing anything at home. As a result he admitted the patient immediately. Although extensive diagnostic evaluations had been performed in the past, and an enteritis regionalis is most likely, the definite diagnosis still has

to be established. The patient has also been suffering from Systemic Lupus Erythematosis (SLE) for the past 4 years, with the kidneys as focus of primary expression. Therefore, she is being treated by a nephrologist. A relationship between the diarrhoea and the SLE is a diagnostic option. During the admission process the nurse obtains additional information. The patient tells her that initially, about 4 years ago, the complaints were vague. Marital stress had once been suggested by her family physician, who thought that she might have chronic fatigue. The patient felt offended by this suggestion and therefore lost all confidence in doctors. The family physician eventually referred her to an internist, who arranged for her to undergo many diagnostic tests before diagnosing SLE with primary expression in the kidneys. The nephrologist then initiated treatment with corticosteroids and endoxan. Although the doctors were satisfied with the results, and she felt a little better, she hated the congested look on her face that was induced by the medication. She therefore stopped taking her medication sometimes. The patient now shows resistance and has doubts about her therapy, but does basically do what the doctors tell her to do. After a recent visit to an infertility clinic it also became clear that, in view of her current illness, her chances of becoming pregnant were considered to be minimal, and that she would not be eligible to participate in a fertilisation programme. From being a cheerful adolescent, she has gradually become a person with negative feelings about herself, feelings of not being a good partner for her husband, and always feeling tired. As a result she has neglected her leisure activities. About a year ago, after being informed that she would not be able to have children, her mental condition declined and she attempted suicide. Because she did not tell anyone about this suicide attempt, she received no specific treatment. The relationship with her husband also deteriorated during this period, but it has now stabilised and her husband is supportive. Although her relatives live far away, she speaks to them regularly, and she also has some good friends. She managed to get a volunteer job in a day-care centre for small children, but during the past month she has been unable to cope. The diarrhoea makes her feel weak. Her mood has deteriorated again, and she has been thinking about the way her life has changed. Again, she often wishes that she was dead.

INTERMED IN PRACTICE

When described according to the 4 dimensions of the INTERMED, we come to an interpretation of the history and current status presented in this case-description. The classification between brackets refers to the specific INTERMED variable ( ) and its actual scoring [ ].(Figure 1, Table 2)

Biological dimension: This patient suffers from a complicated medical illness (chronicity [2]), but definite diagnoses have still not been established (diagnostic dilemma [2]). The patient's already complicated medical condition has become even more complex, due to new symptoms of unclear origin (diagnostic challenge [2]), which make her almost incapable of doing anything at home (severity of symptoms [2]).

Psychological dimension: From a cheerful adolescent she has become a person with negative self-esteem (psychiatric dysfunction [1]). She has a history of attempted suicide (restrictions in coping [3]), and at the present moment she often thinks that it would be better if she was dead. This suggests that the patient suffers from a depressive disorder (psychiatric symptoms [2]). Doubts about the therapy and treatment in the past and her current psychological state make her vulnerable for non-compliance (resistance to treatment [1]).

Social dimension: The patient has a supportive husband and good contact with her family and friends, but no work (restrictions of network [1]). She is able to maintain meaningful relationships with others (social dysfunction [0]), but she has been unable to continue with her volunteer work for the past month, and has neglected her leisure activities for a long time (restrictions in integration [1]). Although she feels too ill to do anything at home, with some help from her husband she is able to live independently at home (residential instability [0]).

Organisation of health care dimension: Various different specialists have been involved in the treatment of this patient in the past 5 years, but there have been no hospital admissions (intensity of treatment [2]). Her lack of confidence in doctors has been influenced through her history of changing diagnoses, and she felt offended by the suggestion that she suffered from chronic fatigue (treatment experience [1]). At this moment she is in hospital and several specialists are involved (organisation of care [1]). The current admission was unplanned (appropriateness of referral [1]).

The 4 dimensions of the INTERMED prognosis are as follows:

Biological dimension: The complexity of this patient is reflected in a high sub-score (10 points) on the biological axis. The prognosis for this patient is a substantial limitation in her activities in daily life, due to her chronic condition and related need for physical care (complications and life threat [2]).

Psychological dimension: A psychiatric consult should confirm the suspicion of a depression (mental health threat [2]), and a (psychiatric) liaison nurse should instruct the ward staff with regard to the approach towards the patient and arrange for post-discharge psychiatric care**.** Action is needed in order to increase the patient's compliance. This is a psychologically vulnerable patient, as is indicated by a high sub-score of 9 points.

Social dimension: Despite her vulnerabilities on the other axes, this patient has reasonably good social circumstances, reflected in a low sub-score of 3 points on the social axis. It is expected that after her discharge from hospital she will be able to do some housekeeping again. She will need support to return to her volunteer work and to recommence her leisure activities (social vulnerability [1]).

Organisation of health care dimension: Serious efforts are needed to organise the care (co-ordination [3]) for this patient, as is reflected in a high total score of 30 points, 10 points above the cut-off score indicating the need for case management.[14]

FROM ANALYSIS TO CO-ORDINATED CARE

The INTERMED method facilitates the correct identification of risks, but may only be effective when followed by an integrated care plan. This care plan should include state-of-the-art medical insights, a multidisciplinary approach, and co-ordination of all the health care disciplines that are involved.

A thorough careful medical examination and analyses of complex etiological considerations must be performed. The high score on the biological factor 'diagnostic challenge' can be interpreted in terms of complex etiological considerations which require more extensive diagnostic assessment, including

the side-effects of medication. The loss of vitality can be seen as a consequence of the illness, the infertility, depression, or the lack of a meaningful working life. Therefore, a medical examination and analyses must be completed by a psychiatric consultant.

A multidisciplinary case-conference during the hospital stay will be organised as soon as a psychiatric consultation has been effectuated. Co-ordination of the care is necessary when the patient is discharged, so the ambulatory case manager (CM) will be invited to attend this case conference. One of the goals during the case-conference is the organisation of the co-ordinated care, especially because this patient has a history of changing diagnoses and a lack of confidence in doctors. For the period of hospitalization a care co-ordinator (usually a nurse) will be assigned to carry out and overview the multidisciplinary treatment plan and to communicate with the patient and her husband to ensure that they are well informed and unambiguous about the diagnoses and the treatment plan. Another goal is to improve post-discharge compliance, so during the patient's hospital stay the care co-ordinator has to negotiate with the patient about the medication regime, and further lifestyle advice must be discussed. If the patient is depressed, therapy has to be started during hospitalization. This can include medication, psychotherapy and psycho-education. The ward staff has to be instructed by a (preferably psychiatric) nurse with regard to their approach towards the patient. When the patient is discharged, the care co-ordinator will inform the ambulatory CM in good time. Consequently, continuation of care is guaranteed since the ambulatory CM will already know about this case and can immediately take over. The CM should, in general, concentrate on the following: interventions focusing on the complex diagnostic problems, such as the risk of rare diseases; interventions focusing on the treatment or the consequences of a psychiatric disease; interventions focusing on the prevention of communication problems between the patient and the care-providers, due to the complexity of the problems as well as on non-compliance, which is either the result of these complexities or the psychiatric complaints (depression); a disease management part focusing on the complications of the various physical diseases, including rehabilitation; interventions focusing on the effects of physical dependency; and finally, interventions focusing on the consequences of social restrictions.[20-22] For this patient there will be more specific implications of the case management interventions. Since this is a chronic case with a complex medical history and

related communication problems, the patient should preferably be treated by invariable staff members. Depending on the local policies, the ambulatory CM or a psychiatrist will treat the patient with medication and psychotherapy.[22] The ambulatory CM will visit the patient on a regular basis at home after discharge, and should be easily accessible for assistance. The ambulatory CM will co-ordinate the care with a specific focus on compliance, as well as on the improvement of social functioning. It implies that the CM will evaluate the medication regime and other lifestyle advice that was given during the hospital stay, and support the patient in returning to her volunteer work. After 3 months an evaluation will be organised by the CM in order to assess whether the goals have been achieved or should be adjusted. The attending medical specialists, the psychiatrist, the family physician and the ambulatory CM should make a joint evaluation of the state of diagnostic complexity, compliance, psychiatric condition, and social functioning, as well as the quality of collaboration and communication between the participating care-providers .The goals will also be adjusted for the coming few months. Aspects to be evaluated should be formulated and discussed with the patient.

DISCUSSION

The aim of this article was to describe a systematic approach (the INTERMED method), to identify complex patients and its applicability in relation to the nursing process.

The development of medical and nursing science in recent decades has resulted in a growing number of medical and nursing sub-specialisations in an attempt to organise health care for patients with complex chronic diseases in the most efficient way. As a result, a variety of disease management programme have been developed.[23-26] Disease management is defined as a population-based approach to chronic diseases.[27] For example, diabetes or heart-failure are diseases for which disease management programmes are suitable. However, although these programmes are an important step towards providing integrated care for the patients, they are not tailored to cope with multi-morbid patients, and often exclude psychiatric health care. Additional morbidity, including psychiatric disorders and inherent behavioural aspects such as non-compliance,

are factors that interfere with the efficient utilization of care facilities, quality care management and quality of life.[28] Moreover, in addition to patients with chronic diseases there are highly complex patients who should be identified and treated appropriately.

Changes are required if we are to meet the care needs of these complex and vulnerable patients.[29] With a considerable increase in the numbers of such patients, we need to provide more productive care for these patients, guided by decision-supported systems such as the INTERMED method.

The INTERMED gives a quick and concise overview of the health risks or needs of a patient. However, it is important to emphasise that the INTERMED is not a diagnostic instrument, so it does not lead to medical or nursing diagnoses. The INTERMED describes the domains of the patient, but even more importantly, it describes in particular the interface between the domains. The INTERMED is designed as an instrument to facilitate inter-disciplinary communication, to be used by workers in various health care disciplines with different levels of education. It offers a framework for a treatment plan, including who should be involved in providing the care. The INTERMED describes the extent to which co-ordination of care is needed, but it does not describe the type of case management interventions that are needed or exactly how the care should be organised.

The applicability and effectiveness of the INTERMED has been assessed in different care settings, and is not dependent on the type of organisation or even the health care system of a country. This gives many opportunities for the implementation of the INTERMED. However, most studies have investigated the implementation of the INTERMED among inpatients, and more research on the INTERMED as a longitudinal instrument is needed, especially in a primary health care setting.

There are indications that patients whose treatment plan has been formulated according to the INTERMED method experience better quality of life and have a shorter stay in hospital.[14] However, there are also indications that if the CM makes patients more aware of their impaired functioning and vulnerabilities by discussing these aspects extensively as part of the intervention, this demands more intense short-term care, and therefore results in an increase in health care costs.[30;31]

From our own experience, we know that co-ordinated care for outpatients is more difficult to establish than for inpatients.[32] Many different health care organisations and health care workers are involved in providing care for complex outpatients (e.g. family physicians, specialists, allied health care professionals, district nurses, psychiatric health care workers, etc.). We found that communication about inpatients among the members of the treatment team was more effective, since the communication lines were short, the case-conferences were arranged more quickly, and informal contact was possible. For instance, on a neurology ward the implementation of the INTERMED method resulted in reducing the time needed for the weekly multidisciplinary conference from 90 minutes to 45 minutes.

It is clear that the INTERMED can not stand alone. It requires a change in the focus from disease-oriented care towards integrated care. It requires training, time, effort, and often specialist expertise, such as psychiatric nursing skills,[33] and the use of a change model to guide implementation is essential,[34] It also requires the approval of the organisation, and the purpose of the integrated programme must be clear to all those who are involved. In many respects, establishing an integrated care programme should be seen as a learning process.[35] A nurse with a broad range of competence, with experience in general health care as well as psychiatric health care, should be appointed to fulfill the role of CM.

Measuring complexity, for instance by means of the INTERMED, should be a basic principle of health care. In our opinion, decision-support methods such as the INTERMED, focusing on complexity, will eventually result in more efficient and better quality care.

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3

Inter-rater reliabiltiy of the INTERMED in a heterogeneous somatic population (short communication)

Peter de Jonge
Corine HM Latour
Frits J Huyse

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ABSTRACT

The INTERMED has been developed to score biopsychosocial case complexity and care needs. In this study, the inter-rater reliability of the INTERMED was assessed by calculating the agreement of two independent raters, based on the same information. Forty-three in- and outpatients with varying somatic complaints were double scored by a psychologist and a psychiatric consultation liaison nurse. Correlations between total scores of the two raters were ranging from 0.91 - 0.96. On item level, in 83% there were no differences between the raters, in 16% there was a 1-point difference and in 1% a 2-point difference. Based on a cut-off score of 20/21, a Kappa of 0.85 was found. We concluded that the two experienced raters had a high agreement, and that after sufficient training the INTERMED can be reliably scored. Its utility in improving health care delivery for patients with complex biopsychosocial care needs still has to be demonstrated.

INTRODUCTION

The INTERMED has been developed in the past years as a method to assess case complexity and resulting care needs in order to organize co-ordinated and integrated health care.[1] In the process of its development, attention has been directed to its reliability,[1] validity,[2] and its clinical utility.[3-6] The reliability study[1] suggested some improvements, which have led to a final version, that has been used in several studies. In this study, we reassessed the inter-rater reliability of the final INTERMED in a heterogeneous sample of in- and outpatients with somatic complaints.

METHOD

Sample

The sample consisted of patients who were admitted to general internal medicine (n=18), traumatology (n=7), who were referred to the psychiatric consultation liaison (C-L) service (n=5), who were attending at the ambulatory service of general internal medicine (n=10), or nephrology outpatient clinic (n=3), all part of the VU hospital in Amsterdam.

Procedure

The responsible physician was asked to give a short description of the patient's medical history and current medical status; when needed the medical chart was also reviewed. Consenting patients were interviewed by one of the two researchers, a psychiatric C–L nurse (CL) or a psychologist (PdJ), in the presence of the other. After the interview, patients were independently scored by the raters.

INTERMED

The INTERMED is an observer-rated instrument that classifies information from a structured medical history taking into four domains: biological, psychological, social, and health care.(Fig. 1) The domains are assessed in the context of time (history, current state, and prognoses) resulting in 20 variables that are scored 0-3. The INTERMED interview can be used in inpatients and outpatients and takes

about 20 minutes,[7] including the scoring. Domain scores are obtained by adding the five variables for each of the domains (range 0–15); the total score is the sum score of the domain scores (range 0–60).

Data analysis

Pearson correlation and Spearman rank correlation between the raters was calculated for the INTERMED total score and the four domain scores (biological, psychological, social, health care). A further evaluation of the interrater reliability was made by computing differences on domain scores and total scores. Since the optimal cut-off score for the need for integral treatment was found to be 20/21,[8] we calculated percentage of agreement and Kappa (κ) based on this criterion.

Figure 1 *INTERMED vignette*

	History	Current situation	Prognoses
Biological	Chronicity Diagnostic dilemma	Severity of symptoms Diagnostic challenge	Complications and life threat
Psychological	Restrictions in coping Psychiatric dysfunctioning	Resistance to treatment Psychiatric symptoms	Mental health threat
Social	Restrictions in integration Social dysfunctioning	Residential instability Restrictions of network	Social vulnerability
Health Care	Intensity of treatment Treatment experience	Organisation of care Appropriateness of referral	Co-ordination

RESULTS

In Table 1, a description of the sample is given. In Table 2, the domain scores and total scores are shown. No systematic differences between the raters were found. On the other hand, considerable variation between the patients was observed. Internal consistency (Cronbach's α) for both raters was .88, which is sufficient.

Table 3 shows high correlations between the domain scores and total scores of the patients for the two raters. All correlations are at least .90, indicating strong correlations.

Table 1 *Background characteristics of the sample (n = 43)*

	n	%
Sex		
Male	22	51
Female	21	49
Marital status		
Not married	12	28
Married	23	54
Divorced/widowed	8	19
Living situation		
Independent	36	84
Partly independent (help at home)	5	12
Dependent (institutionalized)	2	5
Age		
18-40	15	35
41-64	14	33
65-79	9	21
80+	5	12

Table 2 *INTERMED domain and total scores by the two raters*

	Rater 1				Rater 2			
	Mean	S.D.	Min.	Max	Mean	S.D.	Min.	Max.
Biological domain	7.7	3.0	2	14	7.6	3.1	2	14
Psychological domain	4.3	3.5	0	12	4.2	3.6	0	13
Social domain	2.9	2.7	0	9	3.1	3.0	0	9
Health care domain	4.6	2.9	0	13	4.8	2.9	0	12
Total INTERMED score	19.5	9.6	2	43	19.7	10.1	2	44

Table 3 *Correlations (Pearson and Spearman) between two raters*

	Pearson correlation	Spearman rank correlation
Biological domain	.96	.92
Psychological domain	.93	.94
Social domain	.96	.94
Health care domain	.95	.91
Total INTERMED score	.91	.96

Table 4 shows that most of the differences on the domain scores (potential range 0–15) are in the range of 0–2. With respect to the total INTERMED scores (potential range 0–60), for about two-thirds of the patients (29/43), the differences are in the range of 0–2; for a small minority of patients (2/43), the differences in total scores are greater than 5.

Table 4 *Absolute differences between the raters on domain level and total score*

	0	1	2	3	4	5	6 or more
Biological domain	28	9	1	-	1	-	-
Psychological domain	14	23	6	-	-	-	-
Social domain	25	13	3	2	-	-	-
Health care domain	22	16	4	-	-	-	1
Total INTERMED score	7	14	8	7	2	3	2

On the level of individual items (not shown), in 83% (710/860) there were no differences, in 16% (139/860) there was one-point difference, and in 1% (11/860) there was a two-point difference. Most differences were present, as expected, with respect to prognoses. In comparison to the previous reliability study[1] (62% no differences; 33% one-point difference) the agreement was considerably higher. Based on the cut-off score of 20/21 developed by de Jonge et al.,[8] agreement was evaluated by means of the κ statistic, indicating agreement beyond chance. In 40/43 patients (93%), their INTERMED score would have led to the same decision on whether or not some form of care co-ordination should be considered (Table 5). This results in a κ of .85, indicating very good agreement.[9]

Table 5 *Agreement on need for integral treatment*

Rater 2	Rater 1	
	Total score 20 or less	Total score 21 or more
Total score 20 or more	25	2
Total score 21 or more	1	15

DISCUSSION

We found high agreement between two experienced raters in a heterogeneous sample of patients. The two raters scored the patients nearly identical and showed no systematic differences. Moreover, the decision whether or not the patients were in need of some form of extra care was identical in 93% of the cases, or 85% beyond chance. We therefore conclude that the INTERMED can be reliably scored. A training course to learn how to reliably rate the INTERMED has been developed to ensure reliable scoring by clinicians-doctors, nurses, and paramedical health care professionals. Other ways of promoting the use of the INTERMED, such as videotaped interviews with simulated patients are under consideration. The validity of the INTERMED has been described in several patient populations, such as patients with low back pain,[2,6] diabetes,[4] rheumatoid arthritis,[5] patients admitted to internal medicine,[3] and patients referred to a psychiatric C–L service.[10] Its utility in improving health care delivery for patients with complex biopsychosocial care needs still needs to be demonstrated, which is addressed in a series of intervention studies that are being currently conducted.[8]

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4

Nurse led case management for ambulatory complex patients in general health care: a systematic review

Corine HM Latour
Daniëlle AWM vd Windt
Peter de Jonge
Ingrid I Riphagen
Rien de Vos
Frits J Huyse
Wim Stalman
submitted

ABSTRACT

Objective

To systematically summarize the available literature on the effectiveness of post-discharge nurse led case management for complex patients in general health care.

Data sources

We searched MEDLINE, EMBASE, the Cochrane Controlled Trials Register and Cinahl for relevant publications.

Review methods

We included randomized controlled trials, controlled clinical trials, controlled before/after studies and time series studies. The titles and abstracts of references identified by the search were screened by two reviewers. Two reviewers rated the quality of each article on a quality scale. Data extracted from the selected publications included: design, characteristics of the participants, the intervention, type of outcome measures, and results.

Results

We identified 10 relevant publications. Nine studies used re-admission rate as primary outcome. The Relative Risk of re-admissions for case management compared with usual care varied between 0.55 and 1.11. Fewer studies investigated duration of hospital re-admissions, emergency department visits, functional status, quality of life or patient satisfaction. The quality of the included studies varied considerably. In general, results with regard to the effectiveness of case management were conflicting.

Conclusion

There is moderate evidence that case management has a positive effect on patient satisfaction and no effect on emergency department visits. It was not possible to draw firm conclusions on the other outcomes.

INTRODUCTION

Case management has, in recent years, been described as a solution to improve outcomes in complex patients.[1-3] While chronic disease management is defined as a population based approach for specific chronic diseases only (e.g. diabetes mellitus or chronic heart failure) and intervenes with specific programmes,[4] case management is concerned with an optimisation of multidisciplinary treatment for medically complex patients without focusing on a specific illness or population. In case management the focus is not on one specific disease (as in disease management) but on the integral care needs of the individual patient, paying attention to prevention and continuity of care, and therefore an important intervention for patients at high risk for adverse outcomes and excessive healthcare utilization in general.[5] Case management has been applied in the field of psychiatry for a long time. A review of the literature[6] showed that psychiatric case management may be associated with improved compliance and reductions in hospitalization. Over the past decade, more attention has been directed towards the effects of case management in general health care.[2;7-10] These effects have been described from different perspectives: different patient populations (ambulatory versus hospitalized, disease-specific versus general disease populations), various outcomes (re-admission rate, quality of life, patient satisfaction or costs), different supervising medical specialists (general practitioner [GP], psychiatrist, geriatrist, internist), and different forms of additional care (compliance training, counselling, education, relaxation exercises). Moreover, different terms have been used for the same type of care programmes (care co-ordination, patient care-planning or case management).

With respect to the characteristics of complex patients, these patients have by definition multiple health problems in various health domains. In other words: case management is about flexible treatment plans in mixed populations. We defined complex patients as complex medically ill patients with acute or chronic multi-morbid medical condition(s) or symptoms with psychiatric co-morbidity,[11] and/or social vulnerabilities, with more than one healthcare worker involved in the care process. The combined psychiatric, social and physical condition has a deleterious effect on health care utilization, quality of life, morbidity, compliance and mortality in primary care as well as in hospital care,[5;12-14] leading to an

extending duration of hospital stay, more doctor visits, emergency department (ED) visits and more re-admissions.[15-17]

The term case management is used to indicate care programmes in which a healthcare worker, usually a nurse, is appointed to monitor the continuity of care that is provided for complex patients: she or he co-ordinates the activities of the different healthcare workers and, when indicated, refers the patient to other healthcare workers. Because of an increase in the number of patients with complex problems, due to an ageing population and increasing co-morbidity, it is expected that more patients will need case management in the coming years.[3;7;18;19] Furthermore, health care organisation is becoming more complex.[20] Care for the complex medically ill nowadays requires dynamic interventions between the different components of the health care system.[21] Given the importance of case management for health care, and the various research initiatives that have been undertaken over the past few years, we aimed to summarise evidence for the effectiveness of post-discharge nurse led case management for complex patients by means of a systematic review.

METHODS

Criteria for inclusion of studies in this review

Types of studies

Studies published from 1966 until 15th June 2005 were eligible for inclusion in the review; no language restrictions were applied. We included randomized controlled trials (RCT), controlled clinical trials (CCT), controlled before/after studies (CBA) and time series studies addressing the effectiveness of post-discharge nurse led case management for complex patients in general health care.

Types of participants

Studies considered for inclusion in this review focused on ambulatory patients over 18 years of age, and were defined as complex; patients with acute or chronic medical condition(s) and described other vulnerabilities, such as (psychiatric) co-morbidity, frail elderly people, patients with social problems, reduced functional

status or poor quality of life, and with more than one healthcare worker involved in the care process.
Studies were excluded if they focused on only one specific disease, with less attention paid to other vulnerabilities or co-morbidities (e.g. disease management protocols) or when the case management focused solely on psychiatric/mental health care.

Types of interventions
Interventions had to be implemented in an ambulatory setting. There is no clear, objective or widely accepted definition for case management interventions. The criteria used in this review were: assessment of the client's needs, development of a comprehensive service plan, arrangement of service delivery, monitoring and assessment of services, evaluation and follow-up.[6] There were no limits with regard to the types of intervention.
We excluded studies in which the the care was only guided by chronic disease management protocols or guidelines, or if the case manager was an administrative case manager (employed by an insurance company).

Types of outcome measures
Studies with one or more of the following outcomes measures were included: re-admission, duration of hospital re-admissions, ED visits, functional status, quality of life, and patient satisfaction.

Search strategy
In order to identify relevant publications for the review, an extensive search was performed in MEDLINE (1966 until 15th June 2005), (Appendix 1) and an analogous search was performed in EMBASE (1983 until 15th June 2005), the Cochrane Controlled Trials Register (the Cochrane Library Issue 2005), and in Cinahl (1982 until 15th June 2005). Search terms were: patient care management, disease management, case management, patient care team, home care agencies, home care services, house calls, continuity of patient care, pulmonary disease, chronic obstructive bronchial diseases, arthritis, rheumatoid, diabetes mellitus, coronary disease, heart failure, kidney failure, hospitalisation, patient satisfaction, health promotion, longitudinal studies, evaluation studies, nursing evaluation research, health care evaluation mechanisms, programmes

evaluation, outcome assessment (health care), treatment outcome, outcome and process assessment (health care), health services research, comparative study.
The search was completed by checking the references of relevant publications (reviews and identified trials). The titles and abstracts of references identified by the search were screened independently by two reviewers (CL and DvdW) for their potential relevance and design. The full version of an article was obtained if, from this initial assessment, it appeared to meet the inclusion criteria. We screened the papers for eligibility, checking first design than study population, intervention and finally outcome measures. Any disagreements between the reviewers were resolved by discussion.

Methodological quality assessment

The methodological quality of each study was assessed, using the Effective Practice and Organisation of Care (EPOC) quality assessment criteria[22] which were slightly adjusted for this systematic review. Assessment of methodological quality was piloted using a RCT on disease management for heart failure[8] which was not included in the present review. Each study was scored with regard to concealment of allocation, baseline comparability, blinded assessment of primary outcomes, follow-up of patients or episode of care, follow-up of professionals and protection against contamination. (Appendix 2) Disagreements between the reviewers were resolved by discussion. Each item was scored as positive (+), negative (-), unclear (?) or not applicable (X). We used a cut-off point of 4 per item to identify studies of high methodological quality.

General review procedure

The selection of studies (CL and DvdW) were carried out by two independent reviewers. Since one of the reviewers was familiar with some of the studies beforehand, it was decided not to blind the studies for assessment. The methodological quality assessment and data-extraction (CL and PdJ) were carried out by two independent reviewers. The studies were not blinded for authors, institutions or the journals in which they were published because the reviewers were both familiar with the literature on case management.

Study characteristics

The following data were extracted from the studies:

- characteristics of the study: design, conditions and group allocation;
- characteristics of the participants: number of participating patients, number of patients per group, somatic disease and other vulnerabilities;
- characteristics of the intervention: the type of intervention (assessment of the client's needs, development of a comprehensive service plan, arrangement of service delivery, monitoring and assessment of services, evaluation and follow-up), and the frequency and duration of the intervention;
- types of outcomes: re-admission, duration of hospital re-admissions, ED visits, functional status, quality of life, and patient satisfaction.

Data analysis

A qualitative analysis ("best-evidence synthesis") was first performed taking the methodological quality of the studies and the consistency of findings into account.[23] The studies were analysed and scored for each outcome separately. Studies were considered to be of relatively high methodological quality if at least 4 of the 6 quality criteria were met. Consistent findings were defined as statistically significant effects for a specific outcome in favour of case management in at least 75% of all studies.

The best-evidence synthesis resulted in the following levels of evidence:

Level 1- strong evidence: generally consistent findings in multiple high quality studies

Level 2- moderate evidence: generally consistent findings in multiple low quality studies and/or one high quality study

Level 3a- limited evidence: only one low quality study

Level 3b- conflicting evidence: inconsistent findings in multiple studies

Level 4- no evidence: no relevant studies identified.[23]

The results concerning re-admission rate, were presented as relative risks (RR) with corresponding 95% confidence intervals (95% CI). For continuous outcomes (duration of hospitalization, ED visits, functional status, quality of life, and patient satisfaction) the mean difference (MD) and corresponding 95% CI were presented. A quantitative or meta-analysis was anticipated only if there was sufficient homogeneity across studies with regard to the study population (type

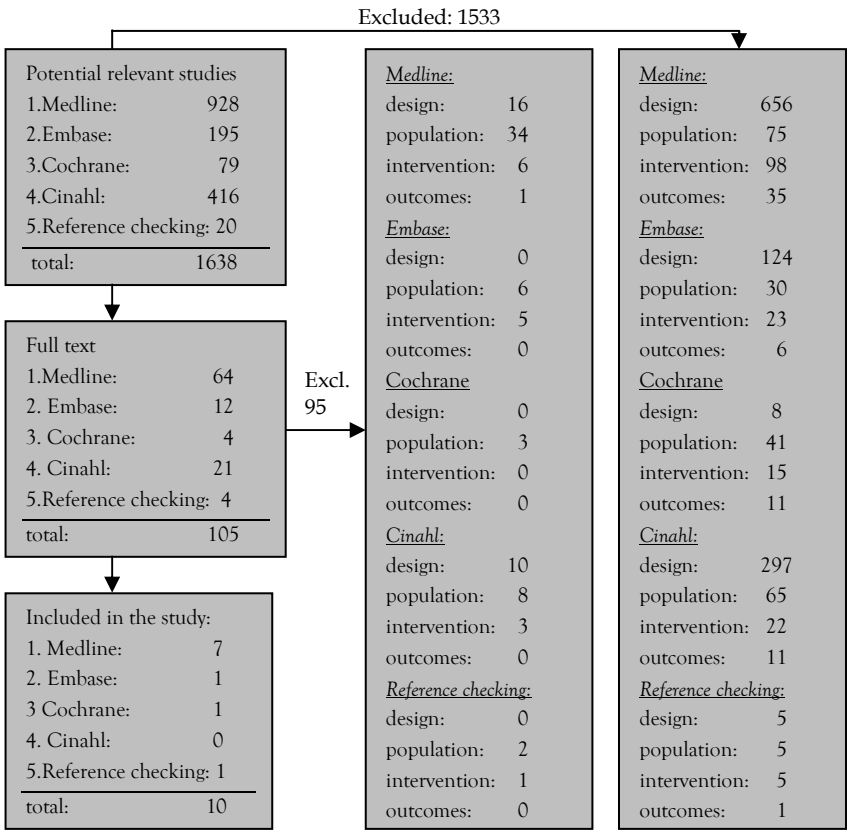
and severity of disease), intervention (content of case management) and outcome assessment (type of outcome measure and length of follow-up).

RESULTS

Literature search and study selection

We first performed our search in MEDLINE (928 titles of articles), then in EMBASE (195 additional hits), and subsequently in the Cochrane Library (79 additional hits) and Cinahl (416 additional hits). By reference-checking we identified an additional 20 hits, resulting in a total of 1638 hits. (Figure 1)

Figure 1 *Process of study selection*



Based on titles and abstracts, 105 full-text articles were retrieved, 10 of which met the inclusion criteria.[1-3;7;9;18;19;24-26] Of the 95 studies that were excluded, (appendix 3) 26 were not an RCT, a CCT, a CBA or a time series design; the patient population of 53 studies was not considered to be complex or the patient complexity was not described explicitly; in 15 studies the intervention did not concern case management; and one study did not use any of the selected outcome measures.

Table 1 *Results of quality assessment of the included studies.* →

First author:	Concealment of allocation	Baseline comparability
Brand ea. 2004[24]	+	-
Laramee ea. 2003[1]	?	-
Lob ea. 2000[25]	?	?
McCorckle ea. 2000[18]	+	-
Naylor ea. 1999[2]	+	+
Rich ea. 1993[19]	?	+
Rich ea. 1995[3]	+	+
Sommers ea. 2000[7]	+	-
Weinberger ea. 1996[9]	+	+
Williams ea. 1994[26]	+	?

positive (+), negative (-), unclear (?), not applicable (X)

Methodological quality of the included studies

Studies were ranked in alphabetical order.(Table 1)

Concealment of allocation was scored positively in 7 out of 10 studies, but baseline comparability was often insufficiently described or negatively evaluated (6/10). The blinded assessment of outcomes and the follow-up of patients were scored for each outcome measure separately. In general, for the more objective, care-related outcome measures (re-admissions, duration of hospital re-admissions, ED visits) the follow-up of patients was mostly evaluated

Blinded assessment of outcomes		Follow up patients	Follow up professionals	Protection against contamination
re-admission	+	+	X	?
ED visits	+	+		
quality of life	-	-		
re-admission	+	+	X	+
hospital days	+	+		
patient satisfaction	-	+		
re-admission	+	-	X	+
hospital days	+	-		
ED visits	+	-		
functional status	?	+	X	+
re-admission	+	+	X	+
hospital days	+	+		
ED visits	+	+		
functional status	+	-		
patient satisfaction	+	-		
re-admission	+	+	X	+
hospital days	+	+		
re-admission	+	+	X	+
hospital days	+	+		
quality of life	?	-		
re-admission	+	+	+	+
ED visits	+	+		
quality of life	-	-		
re-admission	+	+	X	+
hospital days	+	+		
quality of life	+	+		
patient satisfaction	+	+		
Re-admission	?	?	X	+

positively (15/19). For patient-oriented outcome measures (quality of life, functional status and patient satisfaction) more than half of the outcome measurements were evaluated negatively (5/9) with loss to follow-up ranging between 12 and 55%. The follow-up of professionals was only described in one study. All, except one of the studies had positive scores for protection against contamination (9/10).

Study characteristics

The study characteristics are summarized in Table 2.

Eight of the studies were RCTs [1-3;7;9;18;19;26] and two were CBA studies.[24;25] The

Table 2 *Characteristics of included studies* →

First author:	Methods	Participants
Brand ea. 2004[24]	CBA, 2 units sharing a single medical ward. One ward assigned to intervention, other ward to control condition.	166 participants, age ≥ 65, previous admission last 6 month, ≥ 2 active co-morbidity's, admitted with CHF
Laramee ea. 2003[1]	RCT, First simple randomization of patients, later blocks of 8 patients, enrolled by clinical research co-ordinator	287 patients with either primary or secondary heart failure, all ages, having any co-morbidity
Lob ea. 2000[25]	CBA, admission to intervention group by judgment of the case manager	1507 patients, with severe chronic illnesses and documented diagnosis of diabetes, history of frequent hospitalization, psychiatric problems, non compliance or social problems
McCorckle ea. 2000[18]	RCT, randomization of patients, allocation using sealed opaque envelope technique	375 patients, age ≥ 60, newly diagnosed with solid cancer, predicted survival > 6 months, co-morbidities

I = intervention group, C = control group

number of participating patients (median 325, min-max 75 - 1507), and the duration of the follow-up(median 6 month, min-max 3- 18) varied considerably. Some of the populations consisted of frail elderly people, [3;7;18;19;24] others were patients with both somatic diseases and mental health problems [1;25;26] and some studies focused on patients with a high risk of re-admission.[2;9] Case management consisted of assessment of the client's needs, development of a comprehensive service plan, arrangement of service delivery, monitoring and assessment of services, evaluation and follow-up, but frequency and duration of home-visits varied considerably. There was a wide variation in outcome measures. Although re-admission was used as an outcome measure in 9 studies,[1-3;7;9;19;24-26] there was a difference in the definition: only first re-admission (with variable length of follow-up) or any re-admission in the first 60 days after discharge.

Interventions	Authors conclusion
I (83): screening for risk factors, identification of disease, medication, self management, social issues, action plan, co-ordination and liaison, referrals to allied health. Seen within 2 weeks, no home visits. C (83): discharge planning and sometimes outpatient follow up.	3 and 6 months follow up. No significant difference found for re-admission, ED visits and quality of life.
I (141): early discharge planning, patient and family CHF education, promotion of optimal CHF medication. 12 weeks of telephone follow-up; day 1 and 3 after discharge, week 1,2,3,4,6,8,10 and 12. C (146): care as usual.	3 months follow up. Outcomes significantly better in I for patient satisfaction. No significant difference for re-admission rate and hospital days.
I (1050): coordinating care at home and coordinating medical appointments, facilitating care e.g. ongoing support, telephone contact every 1 or 2 weeks. Duration: varied per patient. C (457): ?	12 months follow up. Outcomes significantly better in I for re-admission and total hospital days. No significant difference for ED visits.
I (190): assessment and monitoring of physical, emotional and functional status, teaching, counseling and supporting. Providing direct care if needed, referral. Duration 4 weeks: 3 home visits and 5 telephone calls. C (185): care as usual.	6 months follow up: Outcomes significantly worse in I for functional status.

Table 2 *Characteristics of included studies (continued)* →

First author:	Methods	Participants
Naylor ea. 1999[2]	RCT, randomization of patients, performed by a computer-generated algorithm.	363 patients, with at least 1 somatic diagnosis at admission and poor post-discharge outcomes in an earlier study.
Rich ea. 1993[19]	RCT, Randomization of patients, assigned on a 2:1 basis, stratified according to risk category.	98 patients, age ≥ 70, confirmed heart failure and classified as medium or high risk for early re-admission.
Rich ea. 1995[3]	RCT, randomization of patients with the use of a computer-generated list of random numbers.	282 patients, age ≥ 70, confirmed heart failure and at least one risk factor for early re-admission.
Sommers ea. 2000[7]	Cluster RCT, 18 doctors were randomized using a random number table to C or I group.	543 patients elderly (65+) with at least 2 chronic conditions and functional deficits
Weinberger ea. 1996[9]	Multi-center RCT, randomization of patients, stratified according to entitlement status and index disease. Assignment by telephoning statistical co-ordinator.	1396 patients , with documented diagnoses of DM,HF or COPD, extremely poor quality of life scores at baseline.
Williams ea. 1994[26]	RCT, randomization of patients, using random numbers table.	75 patients, admitted > 3 times within one year, chronic medical illnesses.

I = intervention group, C = control group

Interventions	Authors conclusion
I (177) : direct clinical care, education, co-ordination, referral, compliance increasing interventions, written letter at end of intervention. Duration 4 weeks, at least 2 home visits, additional on needs, telephone availability 7d/w, weekly telephone contact. C (186): care as usual	6 months follow up. Outcomes significantly better in I for re-admission. No significant difference for ED visits, functional status, and patient satisfaction.
I(63): education about CHF, compliance improvement of medication, early discharge planning, emotional support. Home visits in 1st week: 3 times, subsequently visits, possibility for telephone contact. C (35): care as usual.	3 months follow up. No significant difference for re-admission, and hospital days.
I (142): multidisciplinary nurse-directed. Education, compliance improvement of medication and diet, discharge planning, identification of recurrent problems. Home visits in 1st week: 3 times, subsequently visits, possibility for telephone contact. C (140): care as usual.	3 months follow up. Outcomes significantly better in I for re-admission and hospital days.
I (280): assessing health care needs, formulating treatment plan, monitoring, coaching, promotion of community-based services. at least every 6 weeks contact by telephone, home visits or small group sessions. C (263): care as usual.	18 months follow-up. No significant difference for re-admission, ED visits and quality of life.
I (695): assessment of patients post-discharge needs, education, coordinating medical appointments, monitoring and up-dating treatment plan. Telephone contact in 2 days after discharge, discharge appointments. C(701): care as usual.	6 months follow up. Outcomes significantly better in I for patient satisfaction. No significant difference for proportion of re-admission over 6 month and quality of life. Outcome significantly worse in I for days of hospitalization.
I (35) : 9 home visits, obtaining vital signs, cursory physical assessment, patient and family teaching. Duration 3 month, 9 home visits in total C (40): no home nurse visits.	5.5 months follow up. Outcomes in favour of I for re-admission rate.

The number of ED visits was measured in 4 studies.[2;7;24;25] Quality of life or functional status was measured in 6 studies,[2;3;7;9;18;24] but different scales were used or insufficient data were presented to enable the calculation of mean differences.

Effectiveness of case management

Given the heterogeneity across studies with regard to study population and outcome assessment, we decided against statistical pooling of the results.

The best-evidence synthesis resulted in the following conclusions: (Table 3)

Table 3 *Outcomes* →

	Quality Score	*Length of follow-up (months)*	*Patients: N and follow-up (%)*
Re-admission			
Brand ea. 2004[24]	3	3	186/154 (93%)
Laramee ea. 2003[1]	3	3	287/256 (89%)
Lob ea. 2000 25	2	12	1507/782 (52%)
Naylor ea. 1999[2]	5	6	363 (100%)
Rich ea. 1993[19]	4	3	98 (100%)
Rich ea. 1995 [3]	5	3	282 (100%)
Sommers ea. 2000[7]	5	18	543/465 (86.6%)
Weinberger ea. 1996[9]	5	6	1396 (100%)
Williams ea. 1994[26]	2	5.5	insufficient data
Hospital days			
Laramee ea. 2003[1]	3	3	287/256 (89%)
Lob ea. 2000[25]	2	12	1507/782 (52%)
Naylor ea. 1999[2]	5	6	363 (100%)
Rich ea. 1993[19]	4	3	98 (100%)
Rich ea. 1995[3]	5	3	282 (100%)
Weinberger ea. 1996 [9]	5	6	1396 (100%)

Re-admission: McCorckle 2000[18]: not assessed, Sommers 2000[7]*: adjusted OR and longitudinal data-analysis.

Hospital days: Sommers ea. 2000, McCorckle ea. 2000, Williams ea. 1994[7,18,26]: not assessed.

Re-admission

There is conflicting evidence that case management has a positive effect on the number of re-admissions. Nine studies measured re-admission.[1-3;7;9;19;24-26] Three studies,[2;3;7] all of relatively high quality, and one low quality study,[25] reported a positive result in favour of the intervention group. However, four studies,[1;9;19;24] two which were of high quality,[9;19] could not demonstrate significantly better outcomes for case management. One study presented insufficient data,[26] so no conclusion could be drawn.

Hospital days

There is conflicting evidence that case management has a positive effect on the

Intervention group: N (%)	*Control group N (%)*	*RR (95% CI)*
30 (36.1%)	30 (36.1%)	0.97 (0.66 ; 1.45)
49 (37%)	46 (37%)	1.0 (0.74 ; 1.40)
mean change (SD) -0.71 (2.16)	mean change (SD) -0.18 (2.54)	MD (95% CI) -0.53 (-0.89 ; - 0.17)
36 (20.1%)	69 (37.1%)	0.55 (0.39 ; 0.78)
21 (33.3%)	16 (45.7%)	0.73 (0.44 ; 1.2)
41 (28.9%)	59 (42.1%)	0.69 (0.5 ; 0.95)
insufficient data	insufficient data	OR 0.26 (0.08 ; 0.84)*
340 (49%)	308 (44%)	1.11 (0.99 ; 1.25)
insufficient data	insufficient data	insufficient data
Intervention group: Mean (SD)	*Control group: Mean (SD)*	*MD (95% CI)*
6.9 (6.5)	9.5 (9.8)	-2.60 (-4.65 ; -0.55)
Mean change (SD) -5.8 (20.6)	Mean change (SD) - 0.8 (15.7)	-5.00 (-7.62 ; -2.38)
1.53 (3.69)	4.09 (8.53)	-2.56 (-3.88 ; -1.24)
4.3 (8.7)	5.7 (11.8)	-1.40 (-5.86 ; 3.06)
3.9 (10.0)	6.2 (11.4)	-2.30(-4.47 ; -0.13)
10.2 (19.8)	8.8 (19.7)	1.40 (-0.67 ; 3.47)

Table 3 *Outcomes (continued)* →

	Quality score	*Length of follow-up (months)*	*Patients: N and follow-up (%)*
ED-visits			
Brand ea. 2004[24]	3	6	186/154 (93%)
Lob ea. 200[25]	2	12	1507/782 (52%)
Naylor ea. 1999[2]	5	6	363 (100%)
Sommers ea. 2000[7]	5	18	543/465 (85.6%)
Functional status			
McCorckle ea. 2000[18]	3	6	375 /305 (81.3%)
Naylor ea 1999 [2]	4	6	insufficient data
Quality of life			
Brand ea. 2004[24]	1	3	186/118 (71.1%)
Rich ea. 1995[3]	3	3	282/126 (44.6 %)
Sommers ea. 2000[7]	3	18	543/384 (70.7%)
Weinberger ea. 1996[9]	5	6	1396/1187 (85%)
Patient satisfaction			
Laramee ea. 2003[1]	2	3	287 /251(87.5%)
Naylor ea. 1999[2]	4	6	insufficient data
Weinberger ea. 1996[9]	5	6	1396/1187 (85%)

ED-visits: Laramee 2003, Rich 1993,Rich 1995, McCorckle 2000, Weinberger 1996, Williams 1994[1;19; 3;18; 9;26]: not assessed / Naylor 2000[2]†: number of patients unclear / Sommers 2000[7] ‡ adjusted and longitudinal data-analysis. *Functional status:* Laramee 2003, Rich 1995, Rich 1993, Sommers 2000, Weinberger 1996, Lob 2000, Williams 1994[1;3;19;7;9;25;26]: not assessed. *Quality of life:* Laramee 2003, Naylor 1999, McCorckle 2000, Rich 1993, , Lob 2000, Williams 1994[1;2;18;19;25;26]: not assessed. *Patient satisfaction:* Rich 1995, Rich 1993, Sommers 2000, McCorckle 2000, Lob 2000, Williams 19943[18;19;7;25;26]: not assessed.

Intervention group:	*Control group:*	
N (%) 18 (21.7)	N (%) 15 (18.1)	RR (95%CI) 1.17 (0.64 ; 2.15)
Mean change (SD) -0.20 (4.14)	Mean change (SD) -0.14 (3.11)	MD (95%CI) -0.06 (-0.58 ; 0.46)
Mean (SD) 0.1 (0.5)	Mean (SD) 0.2 (0.4)	*p* 0.21†
insufficient data	insufficient data	*P* 0.77‡
Scale	*Intervention* *Mean (SD)*	*Control* *Mean (SD)*	*MD (95 % CI)*
Enforced Social Dependency Scale	18.85 (8.0)	16.94 (6.9)	1.91 (0.24 ; 3.58)
Enforced Social Dependency Scale	insufficient data	insufficient data	n.s.
Assessment of QoL instrument	insufficient data	insufficient data	? (-23.5% - 2.4%)
Chronic heart failure questionnaire	Mean change (SD) 22.1 (20.8)	Mean change (SD) 11.3 (16.4)	10.8 (4.29 ; 17.31)
SF-36	insufficient data	insufficient data	*p* = 0.8
SF-36	insufficient data	insufficient data	n.s.
Participant survey	insufficient data	insufficient data	*p* = 0.01 (13/16 items)
Investigator developed	insufficient data	insufficient data	n.s.
Patient Satisfaction Questionnaire	insufficient data	insufficient data	*p* = 0.01

duration of hospital re-admissions. Six studies measured duration of hospitalization.[1-3;9;19;25] Four studies were of relatively high quality,[2;3;9;19] two which showed a positive result in favour of the intervention group,[2;3] but the other two[9;19] showed no significant differences compared to the control group.

The two studies with low quality scores reported positive effects of case management on the duration of hospitalization.[1;25]

ED visits

There is strong evidence that case management has no significant effect on the number of ED visits. Of the four studies that measured the number of ED visits, two were of high quality[2;7] and two were of low quality.[24;25] None of these studies reported a positive effect on the number of ED visits.

Functional status

There is insufficient evidence that case management has a positive effect on the functional status of patients. Only two studies measured functional status.[2;18] One study, which was of high quality, presented insufficient data[2] but did not found significant difference between intervention and control group. The other study, which was of low quality,[18] also found no significant difference.

Quality of life

There is conflicting evidence that case management has a positive effect on quality of life.

Four studies measured quality of life.[3;7;9;24] Three of these studies presented insufficient data.[7;9;24] One was of high[9] and two were of low quality,[7;24] but none found any difference between the intervention and the control group. The fourth study[3] reported a significant difference in favour of the intervention group, but this study was considered to be of low quality.

Patient satisfaction

There is moderate evidence that case management has a positive effect on patient satisfaction.

Three studies measured patient satisfaction,[1;2;9] but none of these studies presented sufficient data. Two studies, one of high quality[9] and one of low quality[1] reported a positive result in favour of case management. The other study[2] which was of high quality, found no significant difference between the intervention and the control group.

DISCUSSION

In this systematic review we summarized the available literature on the effectiveness of post-discharge nurse led case management for complex patients in general health care. The review provides moderate evidence that case management has a positive effect on patient satisfaction. There is strong evidence that case management has no significant effect on the number of ED visits.

However, given the conflicting results on the other outcome variables it was not possible to draw firm conclusions with regard to the effectiveness of case management on other relevant outcomes.

Search strategy

We cannot rule out the possibility of publication bias, since our review was limited to published research. This may have resulted in an over-estimation of treatment effect[27] as the addition of non-journal publications has been shown to influence effect estimates towards a null result.[28;29] A search for unpublished studies was unfortunately beyond the scope of this review. Our review did not provide strong evidence in favour of case management and contains studies with both positive and negative findings. Given the small number of studies a funnel plot could not provide sufficient evidence to suspect or rule out publication bias. We consider it unlikely that our conclusions would have been greatly affected if we had included unpublished studies.

Quality assessment

The use of a cut-off score of 4 positively evaluated items to identify studies of high quality is arbitrary. However, sensitivity analyses indicate that a cut-off score of 3 or 5 items would not have modified our conclusions to a great extent (data not shown).

It is noteworthy that for the patient-oriented outcome variables (functional status, quality of life and patient satisfaction) the follow-up rates reported in most studies were low (less than 80%). However, in such patients, with complex somatic and psychosocial problems, high follow-up rates are often difficult to achieve, and require much time and effort.

Heterogeneity

Several systematic reviews have been performed evaluating the effectiveness of case management for specific populations with a positive effect on the number of re-admission[30;31] or improvement of glycemic control.[32] One may consider all chronic ill patients (such as diabetes, heart failure or COPD) to be complex, but in practice complex patients constitute a small subgroup[32] (i.e. patients with acute or chronic medical condition[s] and described other vulnerabilities, such as [psychiatric] co-morbidity, frail elderly people, patients with social problems, reduced functional status or poor quality of life). The characteristics of complex patients varied greatly across the studies, and this also applied to the content of the interventions and the duration of follow-up. The heterogeneity in populations, interventions and outcomes found in this study is inherent to the objective of this review. Research that has recently become available describing patients in their levels of complexity related to their health risks and health-related needs,[33;34] but such a systematic assessment of complexity has not yet been widely implemented.

It was often unclear what the actual tasks and responsibilities of the nurses were, and what the most effective components of case management might be. This is understandable, especially for patients with a combination of somatic and psychosocial problems, and in ambulatory care these problems are often vague and diffuse by nature.[35]

Complex patients are not a homogeneous group, but neither are nurses.[36] There is no evidence with regard to the level of education required by nurses, or whether nurses with experience in an ambulatory setting perform better than nurses without such experience. The authority that nurses have from an organisational and budgetary point of view, and the influence on case management, is also unknown.

It is important to take not only statistical significance into account, but also to consider clinical relevance. The studies included in our review reported widely ranging results with regard to the clinical effects of case management. The reported mean difference in duration of hospitalization, for example, ranged between 1 and 5 days over a period of 3 to 12 months, compared to usual care. Such differences in clinical effects may outweigh the additional costs of employing a case manager. As far as we know no economic evaluation of case management has yet been performed among complex patients in ambulatory

care. The case manager is an extra expense, but if this results in less re-admission or enables patients to live longer independently at home with a better quality of life, it could provide strong arguments for the development of case management programmes.

We have to look for methods to organise our health care in such a way that we can provide adequate care for the increasing number of complex patients. At this point we know that chronic disease management programmes can be effective,[4;37;38] but for case management we do not have evidence that they are. Although patients report to be satisfied about case management there is no proof that this is an effective way to organise our care. One of the main difficulties in research in this field is the lack of clear definitions and criteria for case complexity.

There is need for high quality RCTs that include clearly defined measures of complexity or frailty that make it possible to select more homogeneous populations, that are based on focused and well-defined interventions and long-term outcome assessment, and have sufficient statistical power to detect clinically important differences. In chronic disease management programmes, complex patients should be detected so that in future studies these complex patients can be counselled by case managers, and evaluated on important patient outcomes such as re-admission and quality of life, but also to evaluate the cost effectiveness of case management in these patient groups.

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Appendix 1 *Complete search strategy PUBMED 1966 till 15 June 2005*

#1
("Nurses"[MeSH] OR nurse[tw] OR nurses[tw]) AND ("Patient Care Management"[MESH] OR "Disease Management"[MESH] OR "Case Management"[MESH] OR Patient Care Team[mesh] OR ((multidisciplin*[ti] OR interdisciplin*[ti]) AND (care[ti] OR management[ti] OR managing[ti])) OR aftercare[tw] OR "case management"[tw] OR "patient care management"[tw] OR "disease management"[tw] OR "continuity of patient care"[mesh] OR (nurse[ti] AND (led[ti] OR directed[ti]))) AND (copd[tw] OR obstructive pulmonary disease[tw] OR obstructive lung disease[tw] OR "Pulmonary Disease, Chronic Obstructive"[MeSH] OR "bronchial diseases"[mesh] OR asthma[tw] OR asthmatic[tw] OR rheuma[tw] OR rheumatic[tw] OR rheumatoid[tw] OR "arthritis, rheumatoid" [mesh] OR diabetes[tw] OR diabetes mellitus[mesh] OR diabetic[tw] OR "coronary disease"[mesh] OR heart failure[tw] OR "heart failure, congestive"[mesh] OR ((kidney[tw] OR renal[tw]) AND (insufficient[tw] OR insufficiency[tw] OR failure[tw])) OR "kidney failure"[mesh] OR ((chronic[tw] OR chronically[tw]) AND (ill[tw] OR illness[tw] OR illnesses[tw] OR disease[tw] OR diseases[tw] OR diseased[tw])))

#2
("Home Care Agencies"[MeSH] OR "Home Care Services"[MeSH] OR "House Calls"[MeSH] OR ambulatory[tw] OR outpatient[tw] OR outpatients[tw] OR home[ti] OR "home visit"[tw] OR "home visits"[tw] OR "Ambulatory Care Facilities"[MeSH] OR "Ambulatory Care"[MeSH] OR "Outpatient Clinics, Hospital"[MeSH] OR "Outpatients"[MeSH] OR (after[tw] AND discharge[tw]))

#3
("Evaluation Studies"[MeSH] OR "Nursing Evaluation Research"[MeSH] OR "Health Care Evaluation Mechanisms"[MeSH] OR "Program Evaluation"[MeSH] OR "Outcome Assessment (Health Care)"[MeSH] OR "Treatment Outcome"[MeSH] OR "Outcome and Process Assessment (Health Care)"[MeSH] OR "Health Services Research"[MeSH] OR Comparative study[mesh] OR random[tw] OR randomised[tw] OR randomisation[tw] OR randomization[tw] OR clinical trial[pt] OR longitudinal studies[mesh]) AND ("Costs and Cost Analysis"[MeSH] OR Hospitalization[mesh] OR "Quality-Adjusted Life Years"[MeSH] OR Patient satisfaction[mesh] OR Health promotion[mesh] OR outcome[tw] OR

outcomes[tw] OR cost[tw] OR costs[tw] OR qol[tw] OR "quality of life"[tw] OR mortality[tw] OR comorbidity[tw] OR co-morbidity[tw] OR admission[tw] OR re-admission[tw] OR readmission[tw] OR survival[tw])

#1 AND (#2 OR #3) NOT case reports[pt] NOT (child[mesh] NOT adult[mesh])

Appendix 2 *Explanation of the quality assessment criteria*

Quality criteria for RCT's, CCT's and CBA:

- Concealment of allocation (protection against selection bias): positive if the unit of allocation was by patient or episode of care and there was some form of centralised randomisation scheme, an on-site computer system or sealed opaque envelopes were used. Or, for CBA: positive if characteristics of study and control providers are reported and similar.
- Baseline measurements: positive if patient outcomes were measured prior to the intervention and no substantial differences were presented across study groups.
- Blinded assessment of primary outcome(s) (protection against detection bias); positive if the authors state explicitly that the primary outcome variables were assessed blindly or the outcome variables are objective.
- Follow-up of patients or episode of care (protection against exclusion bias): positive if outcome measures obtained for 80 – 100 % of patients are randomised or for patients entered the trial and if there is an objective data collection system.
- Follow-up of professionals (protection against exclusion bias): positive if outcome measures obtained for 80 – 100 % of health care professionals are randomised.
- Protection against contamination: positive if allocation was by community, institution or practice and it is unlikely that the control received the intervention.

Appendix 3 *Reference list excluded studies (95)*

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   Population -
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   Intervention -
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   Population -
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   Design -
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   Intervention -
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   Population -
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   Design -
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Design -
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Design -
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Population -
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Design -
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Intervention -
14. Clark A, Nadash P. The effectiveness of a nurse-led transitional care model for patients with congestive heart failure. Home Healthc Nurse, 22: 160-162.
Design -
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Population -
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Intervention -
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Population -
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Design -
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Design -

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Population -
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Population -
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Design -
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Design -
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Intervention -
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Population -
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Design -
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Design –
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Intervention -

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Population -
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Population -
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Population -
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Population -
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Population -
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Intervention -
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Population -
37. Jaarsma T, van Veldhuisen DJ, van der Wal MH. NHF-COACH multicenter trial in The Netherlands: searching for underlying potentially beneficial mechanisms in nurse led heart failure management. Prog.Cardiovasc.Nurs., 17: 96-98.
Study in progress -
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Outcomes -
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Design -

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Population -
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Population -
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Design -
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Intervention -
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Population -
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Population -
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Population -
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Design -

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Population -
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Population -
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Population -
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Intervention -
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Design -
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Population -
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Design -
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Population -
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Population -
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Population -
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Intervention -
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Population -

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Population -

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Intervention -

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Population -

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Design -

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Design -

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Population -

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Population -

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Population -

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Intervention -

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Population -

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Population -

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Population -

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Intervention -

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Design -

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Population -

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Polulation -

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Population -

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Design -

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Population -

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Design -

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Design -

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Population -

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Design -

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Population -

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Population -

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Population -

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Intervention -

5

Implementing psychiatric interventions on a medical ward: effects on patients' quality of life and length of stay

Peter de Jonge
Corine HM Latour
Frits J Huyse
Psychosomatic Medicine 65: 997 - 1002 (2003)

ABSTRACT

Objective

The authors investigated the effects of implementing psychiatric interventions on a general medical ward by means of a stepped detection and treatment strategy conducted by a consultation liaison (CL) nurse in terms of reducing length of hospital stay (LOS) and improving quality of life (QoL) at discharge.

Materials and Methods

One hundred ninety-three patients participated in a controlled trial, in which patients were screened with COMPRI and INTERMED. A nurse under supervision of a CL psychiatrist conducted interventions, consisting of simple psychiatric interventions by herself, referral to auxiliary services, or initiation of post-discharge care. Intervention patients were compared with historic controls on LOS and QoL (SF36) at discharge.

Results

In multivariate analysis of variance, a significant effect of the intervention on QoL ($p = 0.037$) was found, which diminished after controlling for confounders ($p = 0.28$). No significant effect on LOS was found for the whole sample ($p = 0.72$), but in patients age 65 years or older, a reduction in LOS ($p = 0.05$) was found. This effect remained after controlling for confounders ($p = 0.06$).

Conclusions

These data suggest that screening for risk of increased health care might improve outcomes in general medical inpatients. Because of the design of the study, however, these findings should be considered preliminary and confirmed in a larger, multicenter, randomized controlled trial.

INTRODUCTION

Approximately 27% of patients admitted to medical wards have significant psychiatric disturbances fulfilling DSM-IV criteria.[1] However, implementation of psychiatric interventions in general health care is still limited because of a poor detection rate, both in outpatient and in inpatient care.[2;3]

An important reason for this lack of attention for psychiatric illness seems to lie in the inability to demonstrate the effectiveness of psychiatric interventions on medical outcomes. Two randomized controlled trials have assessed the effectiveness of implementing psychiatric interventions on general medical wards by means of standard screening for psychiatric symptoms and subsequent treatment compared with usual care.[4;5] In one study, the effects of psychiatric consultation on length of stay (LOS) and costs were studied.[5] Within the first days of admission, patients were screened (depression, anxiety, confusion, and pain) and randomized, at the level of ward team, to care as usual or psychiatric consultation. No evidence for a reduction in LOS, hospital-based or post-discharge costs in the next 6 to 21 months, was found. In another study,[4] patients were screened for psychiatric symptoms and randomized to care as usual or to a condition in which a consultation-liaison (CL) psychiatrist gave written treatment recommendations. No evidence was found for an improvement in mental health status or quality of life (QoL), or a reduction in costs, in the next 6 months.

We hypothesized that the lack of effects in these studies stems from a discordance between screening and outcomes: if the goal were to reduce LOS and improve QoL, treatment should be focused on patients at risk for long LOS and poor QoL. We have therefore developed a different strategy to implement psychiatric care on medical wards. The COMPRI was developed and validated in an European study as a quick screening instrument to detect medical patients at risk for increased health care use during hospital stay. It consists of 13 items (yes or no) and is administered in the first two days of admission.[6;7] The INTERMED assesses biopsychosocial care needs and has been validated in medical inpatients.[8-10] A trained nurse, rating 20 items in the range of 0 to 3, can reliably score the INTERMED based on a patient interview. With these instruments, patients at risk for extended hospital stay and poor discharge health status can be detected within the first days of admission.[11] In the present study,

we assessed the effects of this strategy, implemented by a nurse specialist trained in somatic and psychiatric care, working on a medical ward for a CL psychiatric department.

MATERIALS AND METHOD

Design and procedure

The medical ethics committee of the VU hospital approved the study, which had a design with a historic control group. By means of written informed consent, patients consecutively admitted to the two medical wards (general internal medicine and nephrology and gastroenterology) of the VU hospital in Amsterdam, in the period of February 2000 to August 2000 (historic control) and September 2000 to May 2001 (intervention), were asked to participate. In the first days of admission, a research nurse scored the COMPRI, based on information from patient, doctor, nurse and medical chart, and the INTERMED, based on a patient interview of approximately 20 to 30 minutes. Of patients with severe cognitive problems or language deficits, the family was interviewed.

In the first study period (historic control), patients received care as usual; the COMPRI and INTERMED scores were kept hidden from the ward staff, which were encouraged to refer to auxiliary services as they normally would. Similarly, patients were encouraged to communicate any problems to their treating physician. In the intervention period, patients with a COMPRI score more than 5 and an INTERMED score more than 20 were immediately discussed with the responsible doctor and nurse and reviewed in the weekly interdisciplinary case conference attended by representatives of the ward staff, social work, dietician, and physiotherapist. Also, under supervision of a CL psychiatrist, the CL nurse - who also conducted the INTERMED assessment- offered one or more of the following interventions: relatively simple psychiatric or geriatric interventions conducted by the nurse herself, such as alcohol counselling or prevention of delirium; referral to paramedical specialists for diagnosis or treatment, including CL psychiatry; and/or initiation of post-discharge care within 2 weeks after discharge. For example, to improve detection and treatment of delirium, efforts were undertaken to improve timely detection of patients with delirium by the ward nurses by means of observation lists for patients at risk. When patients

with delirium were detected, simple interventions were proposed based on the hospital guidelines for the prevention and treatment of delirium. This included systematic reorientation of the patient, taking care that the patients wear appropriate glasses and hearing aids, and initiation of a psychiatric or geriatric consult.

In figure 1, a case vignette and a description of the interdisciplinary treatment of a patient is described as an example.

Figure 1 *Case vignette and interdisciplinary treatment of a patient*

Case vignette**:** patient was a 62-year-old man having an emergency admission on the department of internal medicine. The reason for admission was ascites and related dyspnoea. Patient was known with hepatitis B, myocardial infarction, rib fracture, ischemic cerebrovascular accident and related expressive aphasia and impaired ventricul functioning. According to the general practitioner, patient was an alcoholic, who used in addition to his cardiac medication about 150 milligrams of oxazepam per day. The differential diagnosis was alcohol cirrhosis, cirrhosis related to hepatitis B or decompensation due to a chronic condition of the heart. Patient was divorced, had two children and had retired two years ago. In the past, the patient has been a heavy drinker until 20 years ago the diagnosis hepatitis B was diagnosed. In the last 10 years he used cocaine on a regular basis but has stopped about a year ago. Patient had almost no contacts. After his divorce there had been a period of three month that he felt blue and was not quite able to keep up with demands of his work. At the moment of the interview, there were no clear cognitive signs on a clinical level, nor signs of withdrawal. Remarkable was the aphasia, which was predominantly expressive, although communication was possible. Patient was tired, preoccupied with the need to have benzodiazepines and indifferent towards life.

The following INTERMED score was obtained (total score = 37):

	HISTORY	**CURRENT STATE**	**PROGNOSES**
Biological	3 Chronicity 1 Diagnostic dilemma	3 Severity of symptoms 1 Diagnostic challenge	2 Complications and life threat
Psychological	3 Restrictions in coping 2 Psychiatric dysfunctioning	1 Resistance to treatment 2 Psychiatric symptoms	3 Mental health threat
Social	1 Restrictions in integration 3 Social dysfunctioning	1 Residential instability 3 Restrictions of network	2 Social vulnerability
Health Care	3 Intensity of treatment 1 Treatment experience	0 Organisation of care 1 Appropriateness of referral	1 Co-ordination

Interdisciplinary treatment: Based on the INTERMED score, a psychiatric and a social work consult were asked for and a multidisciplinary case conference was organized on the 3rd day of admission. To the internist, it became clear that the ascitis was most probably related to a right decompensation. A combination of regorous drug treatment with a punction was sufficient to get the patient in a physical state to start a rehabilitation programme. The psychiatrist diagnosed a depression with passive suicidal ideation and a benzodiazepine dependency. A sedative antidepressant without negative effects on the cardiovascular system was prescribed, and motivational talks to counteract negative thoughts were started to facilitate a transfer to the department of psychiatry. The ward nurses initiated a rehabilitation plan, together with the physiotherapist and the C-L nurse for the period on the ward. After about ten days, the programme started to become effective. Patient was out of bed most of the day, had the feeling that he was less depressed and wanted to start a new life. The benzodiazepines were tapered off. Five days later, the patient was discharged to the psychiatric unit.

A research assistant (not the research nurse who performed the baseline interview and interventions) scored LOS, medical data, and the involvement of auxiliary services at discharge, and gave the SF-36 to the patient. If the form was not returned within 2 weeks, she tried to administer the questionnaire by means of a telephone interview.

Variables

COMPRI

The COMPRI consists of 13 items (yes or no), of which four items are rated by the doctor and three are rated by the nurse.[4;6] A research nurse, employed by the department of psychiatry, rated the six remaining items based on a patient interview.

Predictions made by the doctor were: (1) do you expect this patient to have a hospital stay of at least 2 weeks?; (2) do you think the organization of care during hospital stay will be complex?; (3) do you expect that this patient's mental health will be disturbed during hospital stay?; and (4) is the patient known to have a currently active malignancy? *Predictions made by the nurse were:* (5) do you expect this patient to have a hospital stay of 2 weeks or more?; (6) do you think the organization of care during hospital stay will be complex?; and (7) do you think this patient will be limited in activities of daily living after discharge?

Questions scored by the research nurse were: (8) did the patient have a negative health perception during the past week?; (9) did the patient have walking difficulties during the past 3 months?; (10) did the patient have more than six doctor visits during the past 3 months?; (11) did the patient take more than three different kinds of medication the day before admission?; is this an unplanned admission?; and (12) is the patient retired?

The list of items was derived from an extensive list of potential risk factors for hospital-based health care utilization. In a prospective study of 2158 patients from 10 hospitals in seven European countries, the items that were most predictive of LOS and a series of other indicators for hospital-based care utilization were selected.[6;7] Items 1 through 4 and 5 through 7 are given a weight of 2 points for every positive rating; the remaining items are given a weight of 1 point for every positive rating. The scores are summed, resulting in a potential score range of 0 to 19. Elsewhere, we found that the admission COMPRI score was correlated to a series of outcomes at discharge (e.g. LOS: $r = 0.47$; $p < 0.01$; number of medications during hospital stay: $r = 0.49$; $p < 0.01$; complexity rating by doctor: $r = 0.46$; $p < 0.01$; complexity rating by doctor: $r = 0.46$; $p < 0.01$; complexity rating by nurse: $r = 0.49$; $p < 0.01$).[6;7]

INTERMED

The INTERMED consists of a grid with four domains: biological, psychological, social, and health care.[8] Of each of the four domains, five variables are rated 0 to 3 according to a manual with clinical anchor points, resulting in a potential score range of 0 to 60. Scoring is based on a patient interview and a review of the medical chart. The following variables were scored: (1) chronicity; (2) diagnostic dilemma; (3) severity of symptoms; (4) diagnostic challenge; (5) complications and life threat; (6) restrictions in coping; (7) past psychiatric dysfunctioning; (8) resistance to treatment; (9) psychiatric symptoms; (10) mental health threat; (11) restrictions in integration; (12) social dysfunctioning; (13) residential instability; (14) restrictions in network; (15) social vulnerability; (16) intensity of previous treatment; (17) past treatment experience; (18) organization of care; (19) appropriateness of referral, and (20) need for co-ordination of care.

Elsewhere, we reported on the development, reliability, validity, and applications of the INTERMED.[8-16] A cut off score of 20 to 21 was found to be optimal in detecting patients at risk of long LOS and poor QoL at discharge.[11]

For this cut-off score, we also found good inter-rater reliability between two raters, as indicated by a Kappa of 0.85.[12]

SF-36

To assess QoL, we used the SF-36 because it is focused on physical, social, and mental aspects of functioning and health. The SF-36 consists of 36 items organized into eight scales (physical functioning, social functioning, role limitations caused by physical pain and mental health, role limitations caused by emotional problems, vitality, and general health).[17] Each of the scales was recoded into standardized scores with a scoring range between 0 and 100 (100 = optimal functioning). When scores on one or two of the items in a scale were missing, the median score on that item was used for extrapolation. We used the acute version of the instrument[18;19] that uses a time frame of the past week (as opposed to the past 4 weeks) as such a shorter recall period would be more sensitive to changes in health status during hospital stay. This version has psychometric qualities comparable with the 4-week version. We used the Dutch translation, which has been developed and validated in the International Quality of Life Assessment Project.[20]

Medical Data

At discharge, the medical file was examined for LOS, medication use at admission and discharge, and referral to the following auxiliary services: CL psychiatry, transfer nurse, physiotherapy, social work, dietetics, medical psychology, and geriatric medicine. Also, a crude categorization was made with respect to the admission problem. Two independent raters scored whether the problem was gastroenterologic, endocrinologic, cardiologic, pulmonologic, nephrologic, an infectious disease, or other.

Statistical analysis

Of the surviving patients, LOS and QoL of the positively screened patients in experimental group were compared with the controls. For QoL, multivariate analysis of variance (MANCOVA) was used with the eight scales as multiple dependent variables, controlling for the following confounders: age, sex, COMPRI score, and INTERMED score. For LOS, because of its skewness, nonparametric statistics were used to assess group differences (Mann-Whitney's

U-test). To control for confounders, multiple regression analysis on the natural logarithmic transformation of LOS, was conducted with the same confounders as in the MANCOVA. All analyses were performed on intention-to-treat basis and were based on two-tailed tests. As a secondary analysis, a comparison was made between outcomes of the negatively screened patients in the intervention group and the control group to study potential time effects.

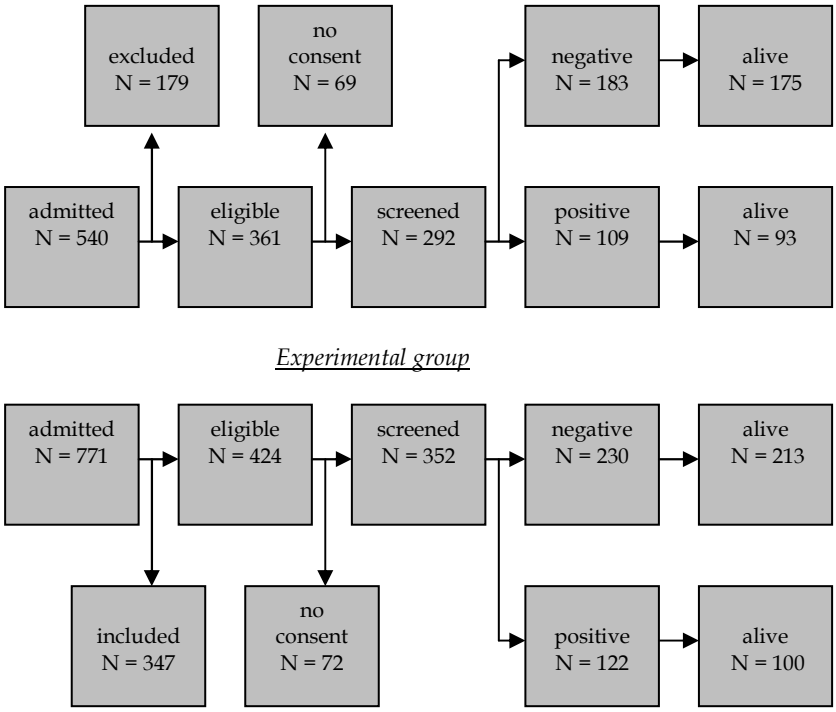
RESULTS

During the study period, 1311 patients were admitted. Patients were excluded if admitted for a specialty other than general internal medicine, nephrology, or gastroenterology (N = 267), if LOS was less than 2 days (N = 167), or if the patients had already been enrolled in the study before (N = 92). Of the remaining 785 patients, informed consent was obtained from 644 patients (82%), equally distributed among experimental (83%) and control patients (81%). Screening resulted in 231 positive cases (36%), comparable for experimental (35%) and control patients (37%). At discharge, 193 positive cases were alive (93 historic controls and 100 intervention patients). Of the 93 patients in the control group, 22 (24%) were interviewed on the first day of admission, 33 (35%) on the second day, and 37 (40%) on the third day (one missing data). Of the 100 patients in the intervention group, 32 (32%) were interviewed on the first day, 42 (42%) on the second day, and 23 (23%) on the third day (three missing data). In the intervention period, timing of the interviews tended to be slightly earlier, although this was not significant (χ^2=6.95; p = 0.07).

No difference in survival between positive experimental (82%) and control patients (85%) was found (χ^2 = 0.47; df = 1; p = 0.49). Of the patients alive at discharge, QoL assessment was obtained in 143 patients (62 controls [67%] and 81 intervention patients [81%]). Patients with missing QoL assessment did not significantly differ on baseline variables: sex, marital status, dependent living, age, length of stay, INTERMED score, and COMPRI score. No significant differences were found when these comparisons were made for the baseline and the intervention sample, separately. In figure 2, the study flow chart is shown.

In table 1, a comparison between baseline and intervention patients is shown. With respect to the admission data, patients in the intervention group were

Figure 2 *Study flow chart*



significantly older. No differences occurred on other socio-demographic or medical admission data. As expected, the referral pattern to auxiliary services differed between baseline and intervention period because of the addition of the CL nurse on the ward. Still, even during the baseline period, most of the detected patients were actually referred to the auxiliary services on the physician's initiative. Most clearly, more patients were referred to CL psychiatry during the intervention period, but also a significant difference occurred on referral to social work. For the remaining services, no differences occurred.

Of the 100 positive experimental patients, the nurse was actually involved in 95; the remaining five were either discharged before her involvement or were considered as "false-positives" who needed standard care. The nurse conducted

psychiatric or geriatric interventions herself in 52 patients (55%). Of the 64 patients referred to CL psychiatry, the most common diagnoses were delirium (19%), dementia (18%), and depression (14%); in 49 of the 64 referred patients (76%), psychoactive drugs were prescribed. In 34 patients (36%), help at home was organized, and in 16 (17%) patients, ambulatory psychiatric care was organized. Of the baseline patients, seven of 93 (7.5%) were referred to either a psychiatric hospital or a nurse home, whereas of the intervention patients, 17 of

Table 1 *Comparison between historic control and intervention patients on baseline data and referral pattern*

	Historic control (N=93)	**Intervention (N=100)**	**Test-value**	***P***
Demographic:				
Age (mean, SD)	61.9 (17.7)	69.7 (17.6)	T=-3.08	0.002
Sex (male,%)	43 (46%)	45 (45%)	χ^2=0.03	0.86
Marital status:				
married:	27 (29%)	35 (35%)		
unmarried	25 (27%)	30 (30%)		
widowed / divorced	38 (41%)	33 (33%)	χ^2=1.52	0.47
Living situation:				
independent	58 (62%)	72 (72%)		
dependent on others	32 (34%)	28 (28%)	χ^2=1.37	0.26
N types of medications (mean, SD)	5.9 (3.5)	6.1 (3.6)	T=-0.28	0.78
Primary admission problem:				
gastro-enterologic	29 (31%)	23 (23%)		
endocrinologic	12 (13%)	9 (9%)		
cardiologic	5 (5%)	13 (13%)		
infectious disease	5 (5%)	9 (9%)		
pulmonologic	13 (14%)	10 (10%)		
nefrologic	7 (8%)	12 (12%)		
other	22 (24%)	24 (24%)	χ^2=1.79	0.29
Referral to auxiliary services:				
C-L psychiatry	24 (26%)	64 (64%)	χ^2=35.5	<0.01
transfer nurse	1 (1%)	2 (2%)	χ^2=0.4	0.52
physiotherapy	29 (31%)	37 (37%)	χ^2=2.1	0.15
social work	6 (6%)	14 (14%)	χ^2=4.1	0.04
dietician	12 (13%)	15 (15%)	χ^2=0.6	0.43
medical psychology	4 (4%)	2 (2%)	χ^2=0.5	0.46
geriatric medicine	7 (8%)	3 (3%)	χ^2=1.4	0.23

100 were referred (17.0%). This difference reached statistical significance ($\chi^2 = 3.97$; $p = 0.046$). No overall significant effect of the intervention on LOS ($p = 0.72$) was observed in the nonparametric test. Because the patient groups significantly differed on age, we repeated the comparisons in younger and in elderly patients. For this analysis we used the pragmatic cut-off point of age 65 years, because this resulted in as many patients as possible for both subgroups. In the subgroup of elderly patients, a shorter LOS was found in the intervention group ($p = 0.05$), whereas in the subgroup of younger patients, no significant differences occurred. The multivariate analysis of variance of the eight SF-36 scales resulted in a significant overall effect of intervention on QoL ($F = 2.1$; $p = 0.037$). In table 2, a comparison of the two groups on outcomes is shown.

Table 2 *Comparison between intervention and historic control patients on LOS and QoL at discharge*

	Historic control (N=93)	**Intervention (N=100)**	**Test-value**	***P***
LOS (days: median, IQR)	13 (7-24.5)	12 (7-21.75)	Z=-0.4	0.72
Age ≥ 65 yrs[a]	16 (9-31.5)	11.5 (7-21.25)	Z= 2.0	0.05
Age < 65 yrs[b]	10 (5.5-22.5)	13.5 (7.75-25.5)	Z=-1.2	0.23
QoL (mean; s.d)[c]				
physical functioning	35.8 (28.8)	28.3 (25.5)	T= 1.7	0.10
social functioning	41.1 (28.9)	48.6 (25.0)	T= 1.7	0.11
role-physical	13.7 (29.9)	11.4 (25.9)	T= 0.5	0.63
role-emotional	27.4 (41.6)	41.6 (47.0)	T=-1.9	0.06
mental health	47.0 (22.9)	50.2 (25.5)	T=-0.8	0.44
vitality	34.5 (19.7)	32.8 (22.4)	T= 0.5	0.63
pain	54.9 (33.6)	60.6 (32.2)	T=-1.0	0.31
general health	34.3 (17.6)	40.2 (20.6)	T=-1.8	0.07

a: N=44 versus 70, b: N=49 versus 30, c: N=63 -64 versus 81-84

After the addition of sex, age, COMPRI, and INTERMED in the multivariate model, a significant effect of age ($F = 4.7$; $p < 0.001$) and non-significant effects of sex ($F = 1.6$; $p = 0.14$), INTERMED ($F = 1.6$; $p = 0.14$), COMPRI ($F = 1.4$; $p = 0.22$), and intervention ($F = 1.2$; $p = 0.28$) were found.

The comparison between outcomes of the negatively screened patients yielded the following results: in the control group (N = 175), a median LOS of 7 days was

found, whereas in the intervention group (N = 213) the median LOS was 8 days (Mann-Whitney's U-test: Z = -1.6, p = 0.10). For patients age 65 or older (in the control group: N = 75), median LOS was 7 days, compared with (N = 106) 9 days (Z = -1.8, p = 0.07) for intervention patients. For patients younger than 65 in the control group (N = 100), a median LOS of 7 days was found; in the intervention group (N =107), the median LOS was 8 days (Z = -0.40, p = 0.69).

DISCUSSION

Results of this study suggest that implementing psychiatric interventions by a CL nurse might improve outcomes in general medical inpatients. We found an overall effect on QoL in the total sample, and we found a reduction of LOS in the elderly patients. However, the effect on QoL was rather small and did not hold after controlling for confounders. The effect on LOS was positive only in the elderly and was independent of the confounders. This finding is in concordance with studies in geriatric medicine.[21;22] The cause for such an effect may lie in earlier detection of psychosocial problems and their subsequent treatment. Often, detection of problems, such as cognitive or mood disorders, occurs late in the course of admission, and in such cases, treatment would prolong hospital stay. In our study, detection of psychosocial problems in the first days of admission most likely improved during the intervention phase.

Overall, the interventions conducted by the CL nurse consisted of simple psychiatric or geriatric interventions performed by herself and more active referral to CL psychiatry. In three quarters of the detected patients, referral to CL psychiatry was requested, which in addition to psychological management often led to the prescription of psychoactive drugs. The addition of the CL nurse on the ward did not produce significant differences in referral to other auxiliary services in the hospital, except for (slightly) more referrals to social work. In most patients seen by the CL nurse, some form of postdischarge care was organized. We were not able to obtain information on this in the historic control group. Together, these observations illustrate that the intervention should not be viewed as strictly psychiatric but may be described as hospital-based case management, with a specific emphasis on psychiatric interventions. Our intervention thus bears some resemblance to the intervention by Curley et al.[23]

describing the introduction of interdisciplinary rounds on medical wards. Because the intervention described in the current study had an effect on the initiation of post-discharge care, we recommend in future research to incorporate an assessment of outcomes some time after discharge.

In this study, a feasible model of implementing psychiatric care on a general medical ward is presented, in which psychiatric co-morbidity appears to be dealt with in an effective way. Our findings should be considered with caution. We were not able to implement the study as a randomized controlled trial because of the fact that the participating wards were not comparable in case mix. The alternative of dividing the two wards into random halves was felt inappropriate because of the threat of contamination between standard care and intervention after the introduction of interdisciplinary case conferences for half of the complex patients. As a result, we could not fully rule out a time effect as an explanation for our findings; however, the finding that LOS increased in non-detected patients during the invention period seems to suggest that a time effect does not explain our reported effects. More problematic seems to be the difference in age between the baseline and intervention patients. Although in our subgroup analyses we demonstrated an effect on LOS of the elderly patients, it remains unclear how age may have interfered with our findings. We therefore conclude that although our findings seem promising, they would need to be confirmed in a larger study, i.e., preferably a multicenter, randomized, controlled trial.

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6

Effectiveness of post-discharge case management in general medical outpatients: a randomized controlled trial

Corine HM Latour
Rien de Vos
Frits J Huyse
Peter de Jonge
Liesbeth AM van Gemert
Wim AB Stalman

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ABSTRACT

Objective

The objective of this study was to determine the impact of post-discharge nurse-led home-based case management intervention on the number of emergency re-admissions and the level of care utilization, quality of life and psychological functioning 24 weeks after discharge

Methods

Patients discharged home from a general hospital were randomly assigned to usual care or nurse-led home-based case management intervention. The primary outcome of the study was the frequency of emergency re-admissions. Secondary outcomes were care utilization, quality of life and psychological functioning.

Results

One-hundred-and-forty-seven patients were randomized, 69 to the control group and 78 to the NHI group. During the 24 weeks of follow-up patients in the NHI group were more frequently re-admitted than patients in the control group (RR 1.30, CI 95% 0.64; 2.58). No significant difference between the two groups was found for care utilization, quality of life or psychological functioning. Patients in the control group tended to move sooner to non-independent living accommodation than patients in the NHI group.

Conclusion

There is no evidence that NHI is more effective than standard care with regard to emergency re-admissions, care utilization, quality of life and psychological functioning.

INTRODUCTION

Hospitals are confronted with an increasing number of vulnerable patients, such as the elderly, and patients with chronic diseases, psychiatric co-morbidity, and a limited social network. In recent years, nurse-led disease management has been found to be an effective strategy for dealing with vulnerable patients with specific diseases (e.g. congestive heart failure or diabetes mellitus).[1-5] While disease management focuses on specific illnesses, case management is concerned with an optimisation of multidisciplinary treatment without being focused on only one specific illness. The effectiveness of case management has mainly been studied in elderly patients.[6-8] It is still unclear to what extent care co-ordination based on case management is an effective strategy for dealing with multimorbid complaints.[9] We do know that the INTERMED is a reliable and valid instrument to identify patients in need of case management,[10-12] and we already demonstrated in an earlier study for patients in a general hospital that care designed according to the INTERMED method resulted in better discharge status and a reduction in the duration of hospitalization.[13;14] However, the extent to which case management is an effective strategy for dealing with a post-discharge outpatient population with multi-morbid complaints is still unclear.

The objective of this study was to determine the impact of post-discharge nurse-led home-based case management intervention (NHI) on the number of emergency re-admissions, the level of care utilization, quality of life and psychological functioning.

METHODS

Design, randomization, blinding and location

To assess the impact of the NHI compared to care as usual, we conducted a randomized controlled trial in patients discharged from a hospital. The patients were allocated to the NHI or care-as-usual, and compared on emergency re-admissions, care utilization, quality of life and psychological functioning. The study was carried out in the Netherlands, at the VU University Medical Center in Amsterdam, between October 2001 and December 2003.

Randomization took place on discharge by an independent co-worker using a concealed randomization list stratified according to age (<60, 60-69, ≥ 70 years). Due to the nature of the intervention, blinding of the patients was not possible. The outcome measurements of emergency re-admission and care utilization were objectively determined by analyzing research forms and medical records, and quality of life and psychological functioning were assessed by means of patient self-report.

Participants

Included were patients admitted to the departments of internal medicine, gastro-enterology, pulmonology and cardiology, who had been admitted at least once (≥ 2 nights) in the previous 5 years since the current admission. They had to be resident in the municipality of Amsterdam, 18 years or older, and able to speak Dutch or English (or have a relative who spoke Dutch or English). Excluded were patients who had been discharged to non-independent living accommodation, patients who had a Mini Mental State Examination (MMSE)[15] score of less than 21 (and had no relative who could help completing the questionnaires) or with planned re-admissions (e.g. chemotherapy). All patients were informed about the background and procedures of the trial (orally and in writing) and had to give informed consent. The Medical Ethical Committee of the VU University Medical Center approved the research protocol.

Intervention

Within 3-10 working days after discharge a case manager (trained nurse specialist), visited the patient at home. The complexity of the patient's status was assessed by means of the INTERMED, which consists of 20 items, each measured on a 4-point scale (0-1-2-3), with a total score ranging from 0-60. A score of ≥ 21 points indicates the need for case management.[14] In order to identify factors associated with case complexity the case manager (CM) and the medical supervisor assessed patients with specific care needs with the INTERMED vignette on six factors: chronic physical illness, psychological vulnerability, diagnostic complexity, compliance/adherence, physical dependency and social functioning, which indicated the required care.[10;11;13;14] The activities of daily living (ADL) and instrumental-ADL (I-ADL) were assessed by means of questionnaires.[16] After consulting the medical supervisor, the CM discussed the

INTERMED care plan with the patient, the general practitioner (GP) and other people who were involved in the treatment.
For the care plan, the following interventions were considered: psychosocial support for the patient and relatives (e.g. structuring, supportive interventions); mediation between patient and medical specialists or allied health professionals, and referral; improvement of compliance with medication, physical exercises, diet, smoking and alcohol recommendations. Self-management was promoted, as well as keeping appointments with care-providers.[3] Depending on the care plan, regular home visits were made by the CM (at least every two months) and the patients were contacted by telephone. The NHI was tailored to the patients' needs and therefore not all interventions were the same for all patients. After 24 weeks the NHI was ended and the patient's GP received a letter reporting on the CM's findings.

Usual care
Patients in the control group did not receive a case management intervention after discharge from the hospital, but received usual care. Care in this group was provided according to the opinion of the medical specialist and the GP.

Data collection and outcome measures
The primary outcome was the number of emergency re-admissions at 24 weeks. Re-admissions and the time from discharge to the first emergency re-admission were recorded on a checklist that was completed by the patient or a relative and cross-referenced with the hospital databases. Care utilization, as secondary outcome, was assessed by means of a specifically developed care diary which was filled in 3 times for a period of 4 weeks by the patient or a relative (1-4 weeks, 9-12 weeks and 21-24 weeks). Information about medication was provided by the patient's pharmacist.
Quality of life was assessed at 0, 12 and 24 weeks with the SF-36 health survey. This questionnaire contains 36 items, which are combined to 8 sub-scales. The scores on each of the sub-scales range from 0 to 100: higher scores indicate a better health status.[17;18] Psychological functioning was assessed with the Hospital Anxiety and Depression Scale (HADS). This questionnaire contains 14 items, which are combined to 2 sub-scales (depression and anxiety), which range from 0 to 21: higher scores indicate more complaints.[19] If the mailed questionnaires

were not returned, the researcher made a follow-up telephone call after 5 working days and, if necessary, again after 10 working days.

Sample size

Based on a pilot study and a literature search, the risk of re-admission within six months was estimated at 50%. The hypothesis was that if this percentage could be reduced to 25%, a total of 130 patients (65 per condition) would be needed (alpha 0.05, power 0.80). Extra patients were sampled, taking drop-out after randomization into account.

Analysis

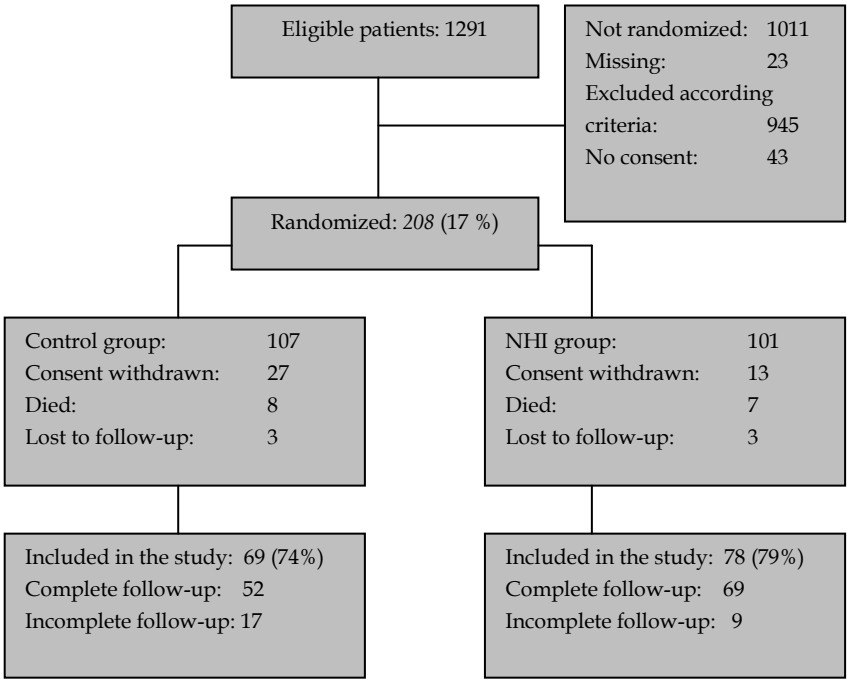
The analysis was carried out according to the intention-to-treat principle. Effects on emergency re-admissions were expressed as in relative risks (RR) and their 95% confidence limits. Kaplan Meier analysis and a log rank test were applied to estimate the difference between the two groups in time to the first emergency re-admission. For the secondary outcomes, mean differences and 95% confidence limits between the two groups for care utilization were calculated by an independent sample *t*-test, or a Mann-Whitney U-test in case of skewed distribution. For quality of life and psychological functioning, median differences and 95% confidence limits between the two groups were calculated.
In a multivariate analysis, using linear regression models, the effects estimated in univariate analysis were corrected for differences in baseline characteristics. A p-value of < 0.05 was considered to be statistically significant. The data were analysed in SPSS for Windows (version 11.0).

RESULTS

Patient characteristics

Of the 1,219 eligible patients, 23 were discharged after office hours and could not be traced, 945 did not meet the inclusion criteria and 43 (3.5%) were unwilling to participate. (Figure 1) Reasons given for non-participation were: felt too ill to fill in questionnaires (21/43, 48.9%), did not want home visits (5/43, 11.6%), did not want to be reminded of the hospital (5/43, 11.6%), objected to the research aims (5/43, 11.6%) or other reasons (7/43, 16.3%,). A total of 208 patients were randomized between October 2001 and December 2003, 107 to the control group

Figure 1 *Flow of patients*



and 101 to the NHI group. There were 61/208 (29.3%) drop-outs (38 in the control group and 23 in the NHI group). Reasons given for drop-out were: withdrawal of consent 40/61 (65.6%) feeling too ill or did not want home visits after all; 15/61 (24.6 %) patients died, and 6/61 (9.8 %) were lost to follow-up. A total of 147/208 (70.7%) patients completed the study with a follow-up of 24 weeks. These patients represented a population with a mean age of 64 years (SD 16.6), half of whom were men. (Table 1) The majority of the patients lived with a partner and 37% (n=54) lived alone. Most of the patients (81.6%) did not have a paid job or were retired. The mean duration of hospitalization was 11.6 days (SD 12.2). The majority of patients had been admitted to the department of internal medicine (41%, n=60), and most of the patients (30.6%) suffer from circulation problems according to ICD 9.

Table 1 *Baseline characteristics*

	control-group N = 69	**NHI-group N = 78**	***P***
Age (average SD)	62.32 (17.50)	65.29 (15.74)	0.35
Gender (N, %)			
male	36 (52.2%)	39 (50%)	
female	33 (47.8%)	39 (50%)	0.79
Marital status (N, %)			
married, living together	42 (60,9 %)	51 (65.4 %)	
living alone	27 (39,1 %)	27 (34,6 %)	0.57
Work status (N, %)			
not working	54 (78,3 %)	66 (84,6 %)	
working	15 (21,7 %)	12 (15,4 %)	0.32
Length of stay in hospital (average, S.D.)	13.3 (15.99)	10.1 (7.04)	0.42
Specialism (N, %)			
internal medicine	24 (34.8)	36 (46.2)	
gastroenterology	15 (21.7)	12 (15.4)	
pulmonology	9 (13.0)	10 (12.8)	
cardiology	21 (30.4)	20 (25.6)	
Medical diagnoses according to ICD 9 (N, %)			
endocrine disorder	5 (7.2 %)	5 (6.4%)	
circulation disorder	19 (27.5 %)	26 (33.3 %)	
respiratory disorder	11 (15.9%)	14 (17.9%)	
gastroenteral disorder	16 (23.2%)	14 (17.9%)	
infectious diseases	4 (5.8%)	3 (3.8%)	
other	14 (20.3%)	16 (20.5%)	
Number of admissions in previous 5 years (average, S.D.)	2.58 (2.58)	1.99 (1.37)	0.44
INTERMED score (average, S.D.)	-	20.35 (6.73)	
MMSE (N,%)			
< 21	1 (1.4 %)	3 (3.8%)	
> 21	68 (98.6%)	75 (96.2 %)	0.44

Four patients were cognitively impaired (MMSE < 21). There were no statistically significant differences in baseline characteristics between the control group and the NHI group, except for psychological functioning (HADS score). With regard to quality of life (SF-36), the control group tended to have a better mental health status and less pain. (Table 1)

Table 1 *Baseline characteristics (continued)*

	control-group N = 69*	**NHI-group N = 78****	***P***
SF-36 median (25 – 75 perc.)			
Domains of SF-36			
physical functioning	32.5 (11 -64)	30.0 (10 - 65)	0.93
physical role	0.0 (0 -25)	0.0 (0 -0)	0.26
emotional role	66.7 (0 -100)	0.0 (0 -100)	0.11
social functioning	50.0 (33 - 67)	44.4 (22 – 56)	0.18
mental health	72.0 (56 -88)	64.0 (48 -80)	0.08
vitality	45.0 (30 - 60)	35.0 (25 –55)	0.11
pain	61.1 (33 - 97)	44.4 (33 –67)	0.08
general health	41.0 (28 -55)	35.0 (25 –54)	0.30
change in health	50.0 (25 - 69)	50.0 (25 -75)	0.62
physical health total	144 (96 – 198)	121.7 (83 –171)	0.10
mental health total	211(156 – 286)	179 (109 – 257)	0.06
HADS median (25 – 75 perc)			
total score	10 (4,3 - 16)	13 (6,5 - 20)	0.03
anxiety total score	4 (2 – 7,8)	6 (3,5- 10)	0.04
depression total score	4 (1,3 - 9)	7 (2 - 11)	0.12

* missing data: N = 17, ** missing data: N = 9

Compared to those who completed the follow-up (control group n=52, NHI group n=69) the baseline characteristics of the patients who did not complete the follow-up (control group n=17, NHI group n=9) were not significantly different. Among the patients who did not complete the follow-up no significant differences were found between the control group and the NHI group.(Appendix 1) Among the drop-outs no significant differences were found between the control group and the NHI group.(Appendix 2)

Nurse-led home-based intervention characteristics

In the NHI group, 72% (n= 56/78) of the first home visits lasted between 30 and 60 minutes, 13% had a shorter duration and 15% had a longer duration. (Table 2) With regard to the second and subsequent visits to these patients 52% (n= 41/79) had a duration of 30–60 minutes, 45.5 % had a shorter duration, and only 2.5%

Table 2 *Intensity of visits and other communications*

Visits, telephone and letters	Number	Range duration in minutes:
Total visits:	258	30 - 40 minutes
first home visit	78	
subsequent home visits	79	
ambulatory clinic visit	33	
last home visit	68	
Total telephone contacts	270	5 - 15 minutes
care-provider	119	
patient	151	
Total letters	78	10 - 20 minutes
medical disciplines	8	
general practitioner	69	
patient	1	

had a longer duration. The visits to the outpatient clinic had a duration of 1-30 minutes (79%, n= 26/33). The telephone was used frequently (270 times with a mean duration of 5-15 minutes), either for contacting patients (151 times), or for consulting care-providers (119 times). The letters that were written to the GP or the medical disciplines for each patient took 10-20 minutes per letter to write.

Since the NHI was tailored to the needs of each individual patient, the interventions were not the same for all patients. The INTERMED factors associated with case-complexity indicated the required care. The ADL and I-ADL scores for each visit provided indications for effective referral to home-care organizations. Referrals were recommended 49 times. (Table 3) Psychosocial support was provided most frequently (394 times), and education least frequently (14 times). The reason for this small amount of education was that patients were encouraged to seek information themselves (e.g. promoting self-management, 69 times).

Outcomes

Eleven patients in the control group (15.9%) and 16 patients in the NHI group (20.6%) were re-admitted for an emergency. The crude relative risk (1.30, 95% CI 0.64-2.58) for emergency re-admission remained similar after adjustment for baseline differences. Survival analysis showed no significant difference between the two groups in time from discharge to the first emergency re-admission (p=0.48). (Figure 2)

Table 3 *Content of interventions NHI group*

NHI	Number of interventions (non-complex / complex)*
Referrals	49 (12/37)
medical disciplines	34 (5/29)
mental health care	4 (0/4)
home-care	7 (3/4)
living accommodation	4 (4/0)
Psychosocial support	394 (144/250)
patient	279 (107/172)
relative	115 (37/78)
Enhancement of compliance	171
medication	29 (8/21)
appointments	35 (10/25)
physical exercise	33 (6/27)
diet	31 (10/21)
smoking	21 (6/15)
alcohol	20 (0/20)
other	2 (1/1)
Promotion of self-management	69 (17/42)
Education	14 (6/8)

*non-complex: INTERMED <21, complex: INTERMED ≥ 21

Figure 2 *Time to emergency re-admission after hospital discharge (days)*

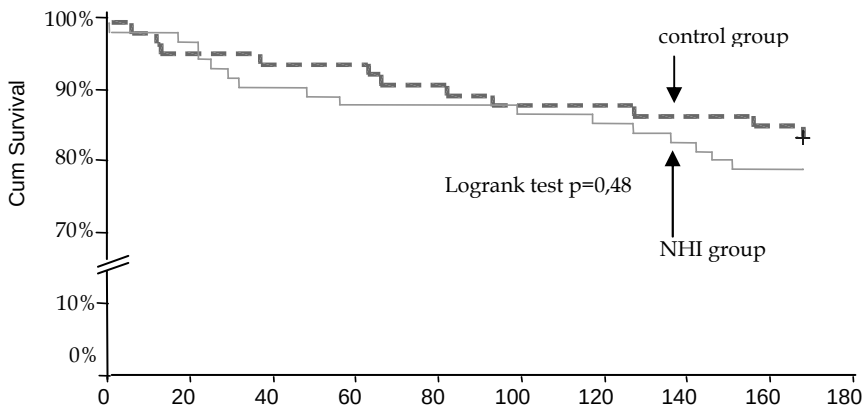
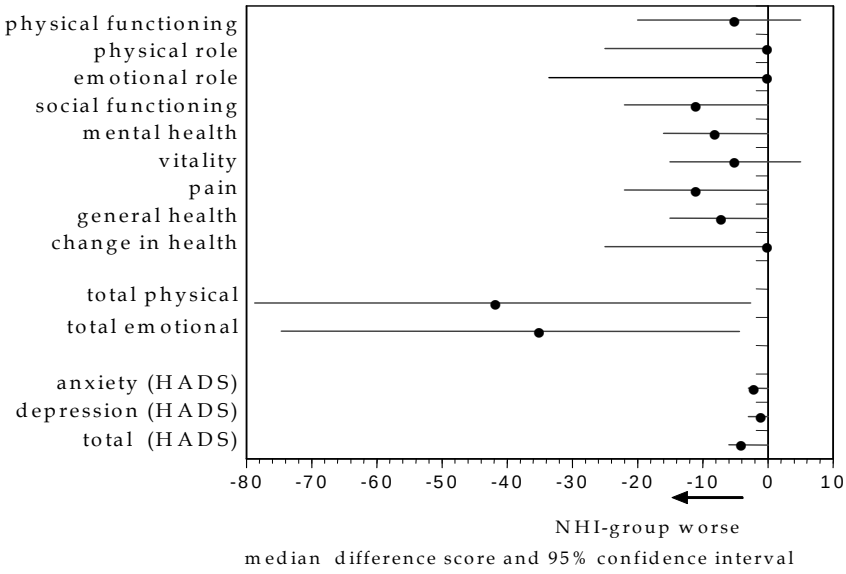


Figure 3

Case management: median difference in quality of life (SF-36) and HADS anxiety, depression and total scores between the control - and the NHI group after 24 weeks



For both groups there was a total of 33 emergency re-admissions (11+16 first re-admission and 6 multiple re-admissions). The median duration of all emergency re-admissions was 11 days (min. 4, max 59) for the control group and 10.5 (min 2, max 68) days for the NHI group, but this difference was not statistically significant (CI 95%, -13 to 6.0 days).

With regard to care utilization by the patients who completed the follow-up (control group n=52, NHI group n=69) the mean differences in general care utilization were not statistically significant. The differences in mean use of primary care services were minimal, but compared to the control group, there was a tendency among patients in the NHI group to make more use of home-care facilities and less use of non-independent living accommodation.

With regard to the quality of life, the median difference in score for the separate dimensions of quality of life (SF 36) and psychological functioning (HADS) indicated an outcome in favour of the control group. (Figure 3) After correction in multivariate analysis for differences in baseline characteristics, no significant differences between the groups were found with regard to the outcome on these two dimensions.

DISCUSSION

We could not demonstrate that NHI is an effective strategy for dealing with a vulnerable post-discharge outpatient population. The NHI did not result in a reduction of emergency re-admissions, or in a reduction of care utilization, or in an improvement in quality of life and psychological functioning. The study did demonstrate a trend towards a possible shift in the direction of home-care facilities and away from non-independent living accommodation.

Our case management study is unique because we studied a general population after discharge from hospital. Other studies in this field of research can be categorized into studies on ambulant case management and studies on disease management. Ambulatory case management studies focus mainly on non-hospitalized elderly patients with a variety of diseases, while disease management studies focus only on patients with one specific illness. It has been demonstrated that disease management is effective,[1;3] and one could be tempted to think that disease management is sufficient. However, it is evident that a considerable number of patients suffer from multiple morbidities, and for these patients a focus on isolated diseases is often not sufficient. Disease management relies on protocols, and it is difficult to capture complex patients in these protocols. The INTERMED method is a reliable and valid instrument to identify patients who are in need of case management,[10-12] and formulates the care for complex patients better than static protocols. We demonstrated in an earlier study that for patients in a general hospital, care based on the INTERMED method resulted in better discharge status than usual care.[13;14] However, we could not demonstrate in the present study that case management is an effective post-discharge strategy, and considered a number of methodological and clinical explanations for the above findings.

First, we considered the power of the study. We do not believe that the current findings result from a lack of power to demonstrate a smaller difference because apart from the confidence intervals, the point estimates do not suggest a positive result.

Selective drop-out (Figure 1, incomplete follow-up), leaving more complex or severely ill patients in the NHI group, could also explain the lack of favourable outcomes for the intervention. Since our study was not designed to measure the complexity of care or the severity of illness in both groups, we used "quality of life on admission" as a proxy for complexity or severity,[14;20] and controlled in the analysis for baseline differences in quality of life and psychological functioning. By doing so we found no indications that differences in complexity or severity explain the results.

Differential work-up could also explain why the NHI had no positive effect: patients in the NHI group were looked more after, received more medical care and were referred more frequently. (Table 3) It has previously been suggested that NHI programmes lead to better care, but not to less emergency re-admissions and less care utilization.[21]

If the NHI provides better care, we would have expected favourable outcomes for patients in NHI group in the domains of quality of life and psychological functioning. However, this was not the case, which made us speculate that the patients in the NHI group could be more aware of their impaired functioning, since the case manager discussed these aspects extensively as part of the intervention, in contrast to patients in the control group, with whom this was not discussed.[22] We did not measure patient satisfaction formally, but in individual contacts the patients reported that they were highly satisfied with the NHI. Similar studies have found that patients were significantly more satisfied with NHI, compared to standard care.[21;23-25] If re-admissions, care utilization and quality of life aspects are not positively influenced by NHI, it remains the question, in view of the amount of care utilization and effort involved, whether the NHI should be applied only on the basis of patient satisfaction.

A clinical explanation for the unfavourable outcomes of the NHI is that we doubt whether the intervention was applied to its full extent, since the co-operation with primary care was not optimal. At the start of the study it was apparent that many GPs had reservations about the aims of the study, and very few were of the opinion that case management would be supportive for their practice.

Communication lines were long and it was difficult to formalise these. The number of health care workers varied per patients. There was an endless number of combinations of patients versus health care workers. It was difficult to inform all persons in question on forehand and there was a lack of information about each others knowledge and working domain. In one patient the GP, the district nurse, the psychologist and the CM of this research were all of the opinion that they supposed to be the case manager of this patient.

In other words: the NHI intervention was based in a secondary care facility and the case manager implemented the NHI in a primary care setting without full commitment of the GPs and other primary health care workers. This is contrary to what was intended: to integrate this period of preventive care in the primary care. In the Netherlands the GP plays a central role in primary health care (where for instance, in the USA the nurse practitioner plays an important role in the out-patient health centres). The problems we experienced would be the same if we performed this study elsewhere than in the Netherlands. We expect the co-ordination problems experienced between the various disciplines to be similar in other countries, regardless the differences in health care systems.

In summary, disease management is effective, but may not be sufficient for complex patients. Case management based on the NHI was not effective in terms of reducing emergency re-admissions, reducing care utilization, or in improving quality of life and psychological functioning. This suggests that these outcomes cannot be expected as a result of improved care for patients who have recently been discharged. NHI should be limited to complex patients and firmly embedded in the primary care system before it can be effective. The intervention was sufficiently intensive for the post-discharge period, but it might have been more effective if the CM visits the patient before discharge. Case management should start in the hospital so the CM can formulate a care plan and discuss this with the primary care team on fore hand, with attention for transition from hospital to home. Primary health care needs can be organised on time whereby the GP and other primary health care workers agree on what to do the moment the patient is discharged. So to our opinion the CM should be based in the primary care (located at a GP practice or an out patient clinic) with a formalised relationship with the hospital.

NHI may result in higher care utilization, but at the same time in improved care, and a desirable shift of care towards home-care services and away from non-independent living accommodation.

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Appendix 1 *Baseline characteristics incomplete follow up*

	Control group Incomplete follow up N = 17	**NHI-group Incomplete follow up N = 9**	***P***
Age (average SD)	61.00 (18.99)	60.44 (18.91)	0.75
Gender (N, %)			
male	11 (64.7%)	6 (66.7%)	
female	6 (35.3%)	3 (33.3%)	0.92
Marital status (N, %)			
married, living together	9 (52.9%)	5 (55.6%)	
living alone	8 (47.1%)	4 (44.4%)	0.90
Work status (N, %)			
not working	16 (94.1%)	7 (77.8%)	
working	1 (5.2%)	2 (22.2%)	0.22
Length of stay in hospital (average, S.D.)	17.71 (21.75)	7.33 (2.23)	0.15
Specialism (N, %)			
internal medicine	9 (52.9 %)	5 (55.6%)	
gastroenterology	1 (5.9%)	-	
pulmonology	1 (5.9%)	2 (22.2%)	
cardiology	6 (35.3%)	2 (22.2%)	
Number of admissions in previous 5 years (average, S.D.)	2.59 (3.20)	1.67 (1.00)	0.56
INTERMED score (average, S.D.)	-	-	
MMSE (N,%)			
< 21	0	0	
> 21	17 (100%)	9 (100%)	1.00

Appendix 2 *Baseline characteristics drop-outs*

	Control group drop-outs‡ N = 38	**NHI-group drop-outs‡ N = 23**	***P***
Age (average SD)	69.13 (16.66)	66.0 (20.15)	0.80
Gender (N, %)			
male	21 (55.3%)	10 (43.5%)	
female	17 (44.7%)	13 (56.5%)	0.38
Marital status (N, %)			
married, living together	16 (42.1%)	10 (43.5%)	
living alone	22 (57.9%)	13 (56.5%)	0.92
Work status (N, %)			
not working	35 (92.1 %)	18 (78.3%)	
working	3 (7.9%)	5 (21.7%)	0.12
Length of stay in hospital (average, S.D.)	12.18 (10,43)	10.3 (6.70)	0.63
Specialism (N, %)			
internal medicine	25 (65.8%)	16 (69.6)	
gastroenterology	3 (7.9%)	2 (8.7%)	
pulmonology	3 (7.9%)	2 (8.7%)	
cardiology	7 (18.4%)	3 (13.0%)	
Number of admissions in previous 5 years (average, S.D.)	1.89 (1.16)	2.65 (1.77)	0.08
INTERMED score (average, S.D.)	-	-	
MMSE (N,%)			
< 21	1 (2.6 %)*	-**	
> 21	35 (92.1%)*	22 (9.6%)**	0.81

*missing 2 / ** missing 1, ‡Drop-out (patients who withdrawn informed consent, died or were lost to follow up)

7

Cost-effectiveness of a nurse-led case management intervention in general medical outpatients: an economic evaluation alongside a randomized controlled trial

Corine HM Latour
Judith E Bosmans
Maurits W van Tulder
Rien de Vos
Frits J Huyse
Peter de Jonge
Liesbeth AM van Gemert
Wim AB Stalman

submitted

ABSTRACT

Background

Hospitals are providing care for an increasing number of vulnerable patients, such as elderly patients or patients with psychiatric co-morbidity. It is still unclear to what extent case management is a cost-effective strategy for dealing with multi-morbid complaints in post-discharge care.

Objective

The objective of this study was to evaluate the cost-effectiveness of a nurse led home-based case management intervention (NHI) after hospital discharge in addition to usual care.

Methods

Economic evaluation alongside a randomized controlled trial with 24 weeks of follow-up. Patients discharged to their home from a general hospital were randomly assigned to NHI or usual care. Clinical outcomes were frequency of emergency re-admissions, quality of life and psychological functioning. Direct costs were measured by means of cost diaries kept by the patients and information obtained from the patients' pharmacists.

Results

One-hundred-and-forty-seven patients were randomized, 78 to the NHI group and 69 to the control group. There was no statistically significant difference in emergency re-admissions during the 24 weeks of follow-up (RR 1.30, CI 95% 0.64; 2.58). There was a substantial difference in total costs between the NHI group and the control group (€ 4286, 95% CI -41 ; 8026), but this difference was not statistically significant.

Conclusion

NHI is not a cost-effective intervention. We do not recommend the implementation of this intervention in populations that do not consist of severely vulnerable and complex patients. Future studies should include complexity assessment on inclusion and evaluate the effectiveness and cost-effectiveness of this intervention in patients with more complex profiles.

INTRODUCTION

Hospitals are providing care for an increasing number of vulnerable patients, such as elderly patients, and patients with chronic diseases, psychiatric co-morbidity, or a limited social network. In recent years, nurse led disease management has been found to be an effective strategy for dealing with patients with specific diseases (e.g. congestive heart failure or diabetes mellitus.[1-6] In contrast to disease management, case management is concerned with an optimisation of multidisciplinary treatment focused on all vulnerable aspects of a patient, and not on one specific illness only. The effectiveness of case management has mainly been studied in the frail elderly,[7-12] but its effectiveness in non-elderly patients with multi-morbid problems, including psychiatric problems, has been investigated in only one study that concerned in-hospital care.[13]

The costs of the treatment provided for these complex patients are high. Approximately 3% of the people insured under a health plan in the USA account for one third of the total health care costs.[14] It is to be expected that there will be a growing number of complex patients, and it is therefore important that we find cost-effective ways to keep our health care expenditure system under control but continue to provide good quality care.

So far, only a few randomized controlled trials have made an economic evaluation of disease management by a nurse. In one study, disease management by a clinical nurse specialist was compared with inpatient and day patient team provided care for patients with rheumatoid arthritis. The intervention of the clinical nurse specialist resulted in equal quality of life and utility, at lower costs.[15] Another study, concerning in-hospital care as well as post-discharge care provided by an advanced practice nurse, showed the same results.[16] However, it is still unclear to what extent care co-ordination based on case management is a cost-effective strategy for dealing with multi-morbid complaints in post-discharge care. We performed this economic evaluation alongside a randomized controlled trial.[17] We expected that patients receiving case management would have less emergency re-admissions, accompanied by lower costs in comparison with patients in the care as usual group.

METHODS

The methods applied in this study are reported in detail elsewhere.[17]

Participants and design:

The study was carried out in the Netherlands, at the VU University Medical Center in Amsterdam, between October 2001 and December 2003. Included were patients admitted to the departments of internal medicine, gastro-enterology, pulmonology and cardiology, who had been admitted at least once (≥ 2 nights) in the previous 5 years. They had to be resident in the municipality of Amsterdam, 18 years or older, and able to speak Dutch or English or have a relative who could help in completing the questionnaires. Excluded were patients who were discharged to non-independent living accommodation, patients who had a Mini Mental State Examination (MMSE)[18] score of less than 21 (and no relative who could help in completing the questionnaires). or with planned re-admissions (e.g. chemotherapy). All patients were informed (orally and in writing) about the background and procedures of the trial, and had to give informed consent.

Randomization took place on discharge. An independent co-worker, who was unaware of the status of the patients, used a computer-generated randomization list, stratified according to age (<60, 60-69, ≥ 70 years), to allocate patients to the NHI group or the control group. Due to the nature of the intervention, blinding of the patients was not possible.

The Medical Ethics Committee of the VU University Medical Center approved the research protocol.

Sample size

Based on a pilot study[19] and a literature search,[12] the risk of re-admission within six months was estimated at 50%. Our sample size was based on the ability to reduce this risk to 25%. A total of 130 patients (65 per group) would be needed (alpha 0.05, power 0.80) to detect this clinically important difference. Extra patients were sampled, taking drop-out after randomization into account.

Intervention

Within 3-10 working days after discharge a case manager (trained nurse specialist) visited each patient at home. The complexity of the patient's status was assessed by means of the INTERMED instrument which consists of 20 items, each measured on a 4-point scale (0,1,2,3), with a total score ranging from 0-60.[20;21] A score of ≥ 21 points indicated the need for case management. For patients with a score of 21 points or more, the case manager (CM) consulted the medical supervisor, and together they developed a care plan.[22] Finally, the CM discussed the INTERMED care plan with the patient, the general practitioner (GP) and any other people who were involved in the treatment.

Depending on the care plan, regular home visits were made by the CM (at least once every two months) and the patients were regularly contacted by telephone. The NHI was tailored to the individual needs of the patients. After 24 weeks the NHI ended and the patient's GP received a letter reporting on the CM's findings.

Control group

Patients in the control group did not receive a case management intervention after discharge from the hospital, but received usual care. Care in this group was provided according to the opinion of the medical specialist and the GP.

Data collection and outcome measures

The primary outcome was the number of emergency re-admissions. Re-admissions and emergency re-admission were recorded on a checklist that was completed by the patient or a relative and cross-referenced with the hospital databases.

Quality of life was assessed at 0, 12 and 24 weeks with the SF-36. This questionnaire contains 36 items, which are combined to form 8 sub-scales. The scores on each of the sub-scales range from 0 to 100: higher scores indicate a better health status.[23;24]

Psychological functioning was assessed at 0, 12 and 24 weeks with the Hospital Anxiety and Depression Scale (HADS). This questionnaire contains 14 items, which are combined to form 2 sub-scales (depression and anxiety), with scores ranging from 0 to 21: a higher score indicates more depressive and/or anxious complaints.[25]

Costs

The economic evaluation was conducted from a health services perspective. Only direct costs were included in the evaluation. Indirect costs were not considered to be relevant because most patients (over 75%) had no job, were retired or, worked less than 60%. Data on health care utilization were collected from the patients by means of a specifically developed care diary and collected in three periods of four weeks (1-4 weeks, 9-12 weeks and 21-24 weeks). The data were linearly interpolated: imputed for periods of 5-9 and 13-21 weeks, using the average costs of the periods before and after. Data on medication use were collected from the patient's pharmacist over the entire follow-up period of 24 weeks.

Primary care costs consisted of GP consultations and visits to allied health professionals (e.g. physiotherapist, dietician etc).

Supportive care costs consisted of district nursing, home care and private care. Secondary care costs consisted of visits to medical specialists, re-admissions to the hospital, and admissions to a rehabilitation clinic, a nursing home or a residential home. Dutch guideline prices were used to value the utilization of care,[26](Table 1) and medication costs were valued according to the prices of the Royal Dutch Society for Pharmacy.

Statistical methods

The analysis was carried out according to the intention-to-treat principle. Only complete cases were included in the primary analysis. Effects on emergency re-admissions were expressed as relative risks (RR) with 95% confidence limits. For quality of life and psychological functioning the mean differences between the two groups were calculated, with 95% confidence limits. Differences between the groups in re-admissions were tested with the Kaplan-Meier test and a log-rank test and differences between the groups in quality of life and psychological functioning were tested by applying multivariate analysis. To compare the mean costs between the two treatment groups, confidence intervals around the mean differences in costs were calculated, using bias-corrected and accelerated bootstrapping with 2000 replications.[27] In the cost-effectiveness analysis, incremental cost-effectiveness ratios were calculated, in which the difference in costs between the two groups was divided by the difference in the number of

Table 1 *Prices included in the economic evaluation*

Product	Price (€)
Primary care	
visit to the general practitioner	17
physiotherapist (per visit)*	18
ergo therapist (per visit)*	18
dietician (per visit)*	21
speech therapist (per visit)*	18
other allied health care professionals (per visit)*	18
Supportive care	
home care per hour	18
district nurse per hour	32
private care per hour	19
Secondary care	
visit to the specialist	73
admission to rehabilitation clinic per day	285
admission to nursing home per day	135
admission to residential home per day	69
admission to academic hospital per day	332
admission to periferal hospital per day	236
day admission to hospital	219
Intervention (per visit)*	17
Medication	variable

* 20 minutes

emergency re-admissions, the difference in the HADS score at 24 weeks, and the difference in quality of life as measured with the SF-36. Uncertainty around the incremental cost-effectiveness ratios was calculated, using the bias-corrected percentile bootstrapping method with 5000 replications.[28] The bootstrapped cost-effect pairs were plotted in a cost-effectiveness plane.[29] A sensitivity analysis was performed in which the outliers were not included.

RESULTS

Baseline measurements

A total of 208 patients were randomized, 101 to the NHI group and 107 to the control group. There were 61 drop-outs, 23 (22.8%) in the NHI group and 38 (35.5%) in the control group. Reasons for drop-out were: withdrawal of consent on discharge from the hospital 40 (65.6%) (13 in the NHI group, 27 in the control

group); 15 (24.6 %) patients died (7 in the NHI group, 8 in the control group), and 6 (9.8 %) were lost to follow-up (3 in the NHI group, 3 in the control group). A total of 147 (70.7%) patients completed the study, 121 of whom had a complete data-set. There were no statistically significant differences in baseline characteristics between patients who completed the follow-up (69 in the NHI group, 52 in the control group) and patients who did not complete follow-up (7 in the control group, 9 in the NHI group). Among those who did not complete the follow-up, no statistically significant differences were found between the NHI group and the control group.

Clinical effects

There was no statistically significant difference in emergency re-admissions during the 24 weeks of follow-up (RR 1.30, CI 95% 0.64; 2.58). There were also no statistically significant differences in the regard to quality of life and psychological functioning. The results concerning the clinical outcomes in this study are reported in detail elsewhere.[17]

Health care utilization

There was no difference in the number of contacts with primary care providers. However, the patients in the NHI group visited a GP significantly more often than the patients in the control group. Patients in the NHI group made more use of supportive care, but these differences were not statistically significant. A small number of patients received supportive care. (Table 2) In the NHI group three patients received around-the-clock home-care during the entire follow-up period of 24 weeks. Patients in the control group tended to move sooner to non-independent living accommodation than patients in the NHI group, but this difference was not statistically significant.

Costs

There was a substantial difference of € 4286 (95% CI -41 ; 8026) in total costs between the NHI group and the control group,(Table 3) but this was not statistically significant. The confidence intervals showed that the costs for supportive care were significantly higher in the NHI group than in the control group (MD 4359, 95% CI 2617 ; 6946) but the costs for admissions to a

Table 2 *care utilization 24 weeks* →

Care utilization (24 weeks)	No. of patients receiving care		NHI Group N = 69 Mean (S.D)
	NHI	Control	
Primary care			
general practitioner (total of contacts)	61	41	7.2 (8.5)
practice visits (number of visits)			3.0 (3.9)
telephone consultation (number of visits)			2.4 (4.2)
home visits (number of visits)			1.7 (5.4)
allied health professionals (total number of visits)	35	19	10.1 (15.2)
physiotherapist (number of visits)			8.6 (14.5)
other allied health professionals (number of visits)			1.4 (4.1)
Supportive care			
district nurse (number of hours)	12	5	5.6 (17.4)
home-care (number of hours)	19	8	28.2 (95.1)
private care (number of hours)	8	3	169.1 (779.6)
Secondary care			
specialist (number of visits)	64	48	7.5 (5.8)
extramural admissions			
rehabilitation clinic (number of days)	3	5	0.3 (1.6)
nursing home (number of days)	1	1	0.4 (3.5)
residential home (number of days)	1	1	0.3 (2.1)

rehabilitation clinic, a nursing home or a residential home were significantly lower in the NHI group than in the control group (MD -1693 95% CI -2764 ; -867). Overall there is a tendency that the costs in the NHI group were higher than in the control group.

Cost-effectiveness

Table 4 shows the mean difference in costs and effects and the accompanying cost-effectiveness ratios for the different outcome measures. The ratios for decrease in number of emergency readmissions and psychological functioning are very large which makes them hard to interpret. These large ratios result from the fact that there was a considerable difference in total costs between the two treatment groups, which was divided by a very small effect difference. Basically, it can be said that the incremental costs in the NHI group are € 4286, while there

	ControlGroup N = 52 Mean (S.D.)	NHI – Control Mean difference (95 %CI)
	5.2 (5.9)	1.96 (-0.77 ; 4.68)
	1.6 (3.0)	1.39 (0.94 ; 2.68)
	3.0 (4.7)	-0.56 (-2.17 ; 1.05)
	0.6 (1.7)	1.13 (-0.42 ; 2.68)
	7.2 (12.2)	2.85 (-2.23 ; 7.93)
	6.1 (11.8)	2.52 (-2.37 ; 7.40)
	1.1 (2.8)	0.34 (-0.98 ; 1.65)
	3.2 (15.0)	2.43 (-3.53 ; 8.39)
	8.5 (24.5)	19.72(-7.06 ; 46.52)
	0.9 (5.3)	168.13(-46.16 ; 382.42)
	6.3 (6.7)	1.21(-1.04 ; 3.46)
	4.5 (18.7)	-4.19 (-8.67 ; 0.28)
	3.2 (23.3)	-2.81 (-8.44 ; 2.82)
	2.2 (15.5)	-1.90 (-5.64 ; 1.84)

was practically no difference in decrease in the number of emergency re-admissions and in psychological functioning. For quality of life as measured by the SF-36 the results are more straightforward: one point of deterioration in the physical health scale of the SF-36 in the NHI group costs € 180 and in the mental health scale € 440. Figure 1 shows the cost-effectiveness plane for emergency re-admissions at 24 weeks. This plane presents 5000 bootstrapped cost-effective pairs, 92% of which are located in the north-west quadrant, indicating that in the NHI group there were higher costs and less effects (more emergency re-admissions) than in the control group, but this was not a statistically significant difference. The cost-effectiveness planes for the SF-36 (physical and emotional sub-group) showed similar results. The plane for the HADS showed slightly higher costs in the NHI group, but no difference in clinical effects.

Sensitivity analysis

Three outliers were identified in the NHI group, and they had extremely high costs for supportive care. A sensitivity analysis was performed without these outliers. This resulted in a mean difference in costs for supportive care between the NHI group and the control group of € 369 (95% CI -83 ; 822) instead of € 4359 (95% 2617 ; 6946), and a difference in total costs of € 360 (95% CI -2079 ; 2798) instead of € 4286 (95% CI -41 ; 8026).

Table 3 *Costs care utilization 24 weeks*

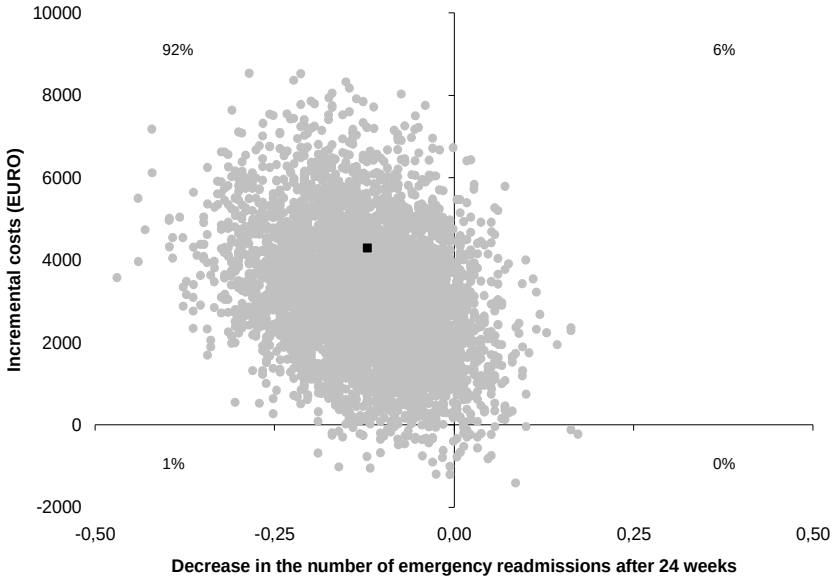
Costs (€)	NHI N =69 Mean (SD)	Control group N = 52 Mean (SD)	NHI – Control Mean difference (95 % CI)
Primary care costs	351 (414)	238 (273)	114 (-10 ; 222)
general practitioner	164 (212)	107 (122)	57 (-4 ; 105)
allied health professionals	187 (283)	130 (228)	57 (-34 ; 147)
Supportive care (district nurse, home-care, private care)	4626 (18914)	270 (728)	4359 (2617 ; 6946)
Secondary care costs	2755 (4761)	3127 (7087)	-371 (-2587 ; 2018)
specialist (number of visits)	581(440)	474 (504)	107(-97 ; 295)
extramural admissions (rehabilitation clinic, nursing home, residential home)	166 (657)	1859 (6137)	-1693 (-2764 ; -867)
hospital re-admissions	1977 (4468)	781 (2823)	1196 (-481 ; 2317)
hospital day-admissions	32 (94)	13 (52)	19 (-9 ; 41)
Other costs			
medication	1082 (1869)	978 (1177)	104 (-400 ; 677)
intervention	81 (39)	0 (0)	81(66 ; 97)*
Total costs	8898 (19521)	4612 (7141)	4286 (-41 ; 8026)

Table 4 *Incremental costs, effects and cost-effectiveness ratios (NHI group compared to control group)*

	ΔC	ΔE	ICER*
Emergency admissions – decrease	4286	0.12	35270
SF-36 physical health – improvement over 24 weeks	4286	-17.2	-249
SF-36 mental health – improvement over 24 weeks	4286	-7.0	-609
HADS – improvement over 24 weeks	4286	-0,04	-112247

ΔC = cost difference in Euros / ΔE = effect difference / ICER = Incremental Cost-Effectiveness Ratio

Figure 1 *Cost-effectiveness plane for decrease in emergency admissions*



DISCUSSION

In this study we evaluated the cost-effectiveness of a nurse led home-based case management intervention (NHI) after hospital discharge in addition to usual care, compared with usual care only. We expected that patients receiving case management would have less emergency re-admissions and would be able to live longer independently at home, resulting in lower costs in the NHI group than in the usual care group. There was no statistically significant difference in emergency re-admissions and we find NHI is not a cost effective intervention. We did perform a cost-effectiveness analysis, because it would be inappropriate to conduct only a cost-minimization analysis on the basis of a lack of effect between NHI group and care as usual group.[30]

The overall costs were higher in the NHI group, but this was not a statistically significantly difference. The costs for supportive care, in particular, were significantly higher in the NHI group than in the control group, but three

outliers in the NHI group were mainly responsible for these extremely high costs for supportive care. After a sensitivity analysis, in which these outliers were not included, the difference in supportive care costs disappeared. In the NHI group the costs of non-independent living accommodation were significantly lower, but in our cost-effectiveness analysis we found that the costs were higher while the difference in effects was quite small. An increase of one emergency re-admission cost over € 25000, can be considered as an irrelevant result, and this is because the difference in costs is divided by a very small difference in effect.

Taking the above results into account, it is tempting to conclude that a case management programme, such as the NHI, is not advisable. However, several comments can be made about this study.

The power analysis was based on effects, and not on costs, and our study lacked the power to detect a relevant difference in costs. This is reflected in wide confidence intervals for cost differences. This is a common problem in economic evaluations. Because the distribution of cost data is typically heavily skewed, very large study populations are needed to detect relevant cost differences.[31]

Another limitation of this study was the number of patients who withdrew their informed consent. Most of the patients who withdrew their consent did so at the very beginning of the study. The main reason for withdrawal was that the patients felt too ill to fill in the questionnaires and the cost dairies. Therefore, we had no baseline measurements for SF-36 and HADS.

Due to logistic circumstances (limited grant) we were not able to perform a clinical assessment with the INTERMED instrument in the control group. Therefore, we had no data on the complexity of the clinical problems in the control group. Consequently, we do not know whether the NHI and the control group were similar at baseline with regard to complexity. We cannot rule out selective drop-out as potential bias. However, the randomization was successful, so baseline incompatibility is very unlikely.

Differential work-up could also explain why the NHI had no positive effect: patients in the NHI group received more support, received more medical care and were referred more frequently. More frequent re-admissions could therefore also be expected. It has previously been suggested that NHI programmes lead to better care, but not to less emergency re-admissions or less care utilization,[17;32] and therefore to less costs. Our results show that patients in the NHI group

tended to stay longer in independent living accommodation than patients in the control group.

A clinical problem was that the NHI intervention was provided in a secondary care facility, while the CM implemented the intervention in a primary care setting. The GPs and the other primary care workers were not fully committed, and the communication lines were long and often inefficient. Nevertheless, the CM succeeded in informing all GPs by telephone and letter, and received feedback from the GPs about the intended intervention plan.

In conclusion we found that the NHI is not a cost-effective intervention, but our study group was too small to enable us to draw firm conclusions. Further studies are required, in which the inclusion criteria focus on severe vulnerability or frailty and the complexity of the care that is needed to identify groups of patients who may benefit most from case management with regard to costs and effects, and also with regard to outcome measurements that not only satisfy the needs of the health care system but, most important off all, also satisfy the needs of the patients.

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8

General discussion

In this final chapter I will reflect on some of the main findings of the studies that have been described, and discuss some general aspects of developments in the co-ordination of care for complex medically ill patients. At the end of this chapter some recommendations are made for future research.

REFLECTION

In our studies, did we include the right population for the case management interventions?

In the ideal situation, only complex patients should be eligible for case management. The concept of complexity with respect to general hospital care is new, and is only mentioned briefly in the literature,[1] but recent research that has become available describes the levels of complexity of patients with regard to their health risks and related needs.[2-5] Plsek defines a complex adaptive system as 'a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that the action of one part changes the context for other agents'.[6] This definition is clear, but very broad. It can be applied to all kinds of levels of complexity, and to patients in need of disease management as well as patients in need of case management.

The Academy of Psychosomatic Medicine (APM) describes complex patients as complex medically ill patients with acute or chronic medical, neurological, obstetrical or surgical condition(s), including patients with unexplained physical conditions, psychiatric co-morbidity and psychiatric disorders, which are the direct consequence of a primary medical condition(s) such as organic psychiatric disorders.[7] In my opinion, this description is well defined, in spite of the fact that it does not include social circumstances.

The INTERMED is a useful and reliable instrument that can be used to detect the type of patients described by the APM.[7] In our cohort study (Chapters 5) we measured the control group and the intervention group with the INTERMED, and this gave us a precise and well-defined overview of standard, chronic and complex patients. However, in our RCT (Chapters 6 and 7) we sacrificed the ideal situation, due to the research restrictions: limited funding and limited time. We did not measure all patients with the INTERMED at baseline, but only the

intervention group. Although randomization was successful, there is still some doubt about the extent to which there was an equal number of complex medically ill patients in each group. Another consequence of not measuring complexity as an inclusion criterion was that we might have included non-complex patients who did not need case management.

Did we include the right studies in our systematic review?

In the studies included in our systematic review (Chapter 4) the diversity of definitions given for case management and disease management was our main concern.

Norris e.a. defines disease management as 'an organized, proactive, multi-component approach to health care delivery that involves all members of a population with a specific disease entity. Care is focused on and integrated across the entire spectrum of the disease and its complications, the prevention of co-morbid conditions, and the relevant aspects of the delivery system'.[8] Essential interventions are: the identification of a population (for instance diabetes), guidelines or performance standards for the provision of care, management of the identified population and information systems for tracing and monitoring.[8] This clear definition makes it possible to distinguish between disease management and case management, contrary to the more compact definition given by Epstein e.a.: 'A population based approach to health care that identifies patients at risk, intervenes with specific programmes of care and measures outcomes.[9]

Ferguson defined case management as 'a program that uses physician or non-physician providers to maintain continuous contact with patients via telephone or in-home visits to prevent disease exacerbation through intensive assessment and education techniques'.[10] This definition gives the same concern as rise to Plesk's definition of complexity: it is very broad and can be applied to all kinds of patients, complex or non-complex. Norris e.a. definition: 'a set of activities whereby the needs of populations of patients at risk for excessive resource utilization, poor outcomes or poor co-ordination of services are identified and addressed through improved planning, co-ordination and provision of care[8] is certainly more specific, it still does not specify the meaning of 'provision of care'. Drennan e.a. describe case management activities as follows: 'identification of individuals likely to benefit from case management; assessment of the

individual's problems and need for services; care planning of activities; co-ordination and referral; regular review, monitoring and consequent adaptation of the care plan.'[11] Stewart e.a. give a more specific description of the interventions: 'psychosocial support for the patient and relatives (e.g. structuring, supportive interventions); mediation between patient and medical specialists or allied health professionals, and referral; improvement of compliance with medication, physical exercises, diet, smoking and alcohol recommendations; promotion of self-management and keeping appointments with care-providers'.[12] In our systematic review we described the interventions as follows: 'assessment of the client's needs, development of a comprehensive service plan, arrangement of service delivery, monitoring and assessment of services, evaluation and follow-up.[13] One can argue that this is also a vague and broad description, and looking back, perhaps the Stewart e.a. description[12] was more appropriate, but then there was a serious risk of excluding case management studies.

This variety of definitions is one of the reasons why the application of the popular concept for disease management and case management has such modest success when tested empirically.[14] Articles sometimes report on case management programmes, in which the intervention corresponds with interventions that are commonly used in disease management programmes or visa versa. Or as Falcone e.a. stated: 'Evaluation of experience with case management is difficult because case management is not as clearly defined as published reports sometimes suggest. At least it is not defined in a way that would allow it to be used unambiguously as an independent or intervening variable in research to test its efficiency, effectiveness and efficacy'.[15] Oxman e.a. reviewed 102 trials and concluded that a wide range of interventions may improve practice, but that there are no 'magic bullets'.[16] Specific problems occur in disease management and case management programmes because they are based on a range of difficult or vaguely described interventions (such as monitoring, psychosocial support, evaluation and follow-up) and there is a lack of understanding or evidence concerning which interventions are effective and which are not.[17] Furthermore, single interventions are often incorporated in multi-component interventions, making it difficult to assess the effectiveness of disease management or case management.[8] Another problem is that the institutions in which programmes are provided vary in terms of organisation,

management and mix of skill, making it not only difficult to replicate the interventions,[18] but also to compare different case management studies.
Although, in our opinion, we selected the right studies, we can still not be sure that case management and the described interventions are as clearly defined as published reports sometimes suggest.[15]

Is a 6 - month follow-up long enough for such intervention studies?
There are indications that case management programmes are only (cost-) effective in the long-term, and not in the short-term,[19] but it is difficult to obtain finance to support long-term research with a sufficiently large group of patients. We focused on patients with a non-specific illness and not on patients with a specific disease, and this made it difficult to obtain financial support, because this study population does not 'fit into' any specific research programmes or funding programmes.
Another problem, especially with the RCT (Chapters 6/7), was that we needed a long 'run-in' time before we found the right formula for maximum performance of the intervention.
Performing a study to measure the effects of case management implies dealing with a group of patients who are not only medically complex, but also complex from a research point of view. In our RCT (Chapters 6/7) it was difficult to include a sufficiently large group of patients, since many of them felt too ill to participate in the research, or we were unable to motivate them to continue until the end of the study period. A 6-month follow up is therefore not long enough.

How was the implementation of the intervention studies performed?
Our assumption that 'ideal' care leads to more effective and more efficient care might have been a flaw in the reasoning, since we did not fully comprehend the resulting implications if we changed certain elements. The research group started the cohort study (Chapter 5) with the approval of the ward. However, the research question (detect patients at risk of extended hospitalization and a poor health status on discharge), as well as an answer to this question (implementing psychiatric interventions) were carefully considered by the research group, but not on the basis of a ward, making imbedding of the interventions difficult. One major issue in the RCT (Chapter 6) was that the intervention was based in a secondary care facility, while the case manager implemented the intervention in

a primary care setting without the full commitment of the general practitioners and other primary health care workers. Another general problem for such intervention studies (Chapters 5,6,7,) is that we had no influence on changing circumstances such as retrenchment in home care, the merging of two wards, all of which influence the outcomes. The problems described above resulted in diffuse structures and non-transparent collaboration with the various health care workers.

Did we measure the right things?

Re-admission rate, for instance, is a frequently used outcome measure in studies investigating the effectiveness of disease management or case management. But sometimes a (re-)admission can be very effective for a patient suffering from complicated medical illnesses which cause diagnostic dilemmas (Chapter 2). What do patients want? Self-management or not? One patient once said: 'I don't want to manage the care by myself. I want a health care worker to take care of my needs and to help me to organise things'. Lower health care costs are not, per definition, a goal for the individual patient. An increase in self-management might be a goal for some patients, but probably not for the majority. We did measure the right things, but although patient satisfaction is not the only and most important outcome measurement, it would have been better if we did measure patient satisfaction because improvement in health care is such a major issue.

When is the right time to measure complexity of care with the INTERMED?

In our cohort study (Chapter 5) we measured complexity within 2 working days after hospitalization, and this gave us enough time to formulate a care plan. In our RCT (Chapter 6/7) we measured complexity within 3 – 10 working days after discharge, but serious problems often occur before the first visit.

One possibility is to collaborate with other developments. During the past 4 years, of course, we were not the only research group to be concerned about the care that is provided for chronically ill and complex patients**.** Two recent developments are of great importance, since they are attuned to each other and to the studies described in this thesis.

The stepped care model: Von Korff describes three assumptions of stepped care models; different people require different levels of care; finding the best level of

care depends on monitoring outcomes; moving from lower to higher levels of care based on observed outcomes can increase effectiveness while lowering costs. Level 1 is monitoring the patient, level 2 is self-management with low intensity support, level 3 is lower intensity care and management service, and level 4 is higher intensity care and management service,[20;21] whereby level 3 can be associated with disease management and level 4 with case management.

Clinical pathways: A clinical pathways is defined as a set of methods and resources to attune the different members of a multidisciplinary and inter-professional team and to focus on a specific patient population (for instance with heart failure),[22] since clinical pathways are primarily developed for homogeneous patient groups.[23] It is, in fact, the realisation of a disease management programme with the goal to ensure high quality and efficient care that extends beyond the walls of institutions.

In the case of hospital care, measuring the complexity of the care within 2 working days is sufficient and achievable. However in the case of post-discharge care, an assessment should perhaps be made during hospitalization (Chapter 2).

In the case of ambulatory care, it could be that an INTERMED assessment at the moment when a patient needs lower intensity care and management service (level 3) would be appropriate in order to measure the health risks and needs.

The development of clinical pathways, extending beyond the walls of institutions ('chain-care') can be an opportunity for the imbedding of research to benefit complex medically ill patients.

RELEVANCE FOR HEALTH CARE

- The aim of the various studies presented in this thesis was to answer the question whether co-ordination of care for complex medically ill patients has a positive effect on health perception and care utilization. The results are conflicting or negative.
- There is an increasing need to effectively detect and treat complex medically ill patients, due to the aging of the population and a growing number of patients with multi-morbid complaints: a group of patients for whom health care has no proper answers as yet.

- Although there are different definitions of disease management and case management, it is clear that disease management focuses on specific patient groups (e.g. patients with diabetes or heart failure), and that case management programmes focus on individual complex patients with multi-morbid complaints. At the start of this research in my opinion disease management and case management were two completely different concepts, separated from each other. However, during the course of time it became clearer that within disease management programmes a varying number of patients are also in need of case management, as a supplement 'in addition to the disease management care'. Therefore it is important to assess complexity, for instance by means of the INTERMED, in order to distinguish between chronically ill patients (in need of disease management) and complex medically ill patients (in need of case management).
- Disease management should contain the following elements: identification of a well-defined population, guidelines or performance standards for the provision of care, management of the identified population and information systems for tracing and monitoring.[8] Basically, case management for complex medically ill patients should contain the following interventions: a. disease management focusing on the complications of one or more somatic diseases and the above- mentioned elements, b. interventions focusing on complex diagnostic problems, such as the risk of rare diseases as well as somatisation, c. interventions focusing on the effects of unavoidable physical dependency; d. interventions focusing on the treatment or the consequences of psychiatric disease, e. interventions focusing on the prevention of problems in the communication between patients and their care providers, due to the complexity of their problem, and also on non-compliance, which is either the result of these complexities or of a psychiatric disease such as depression; f. interventions focusing on the consequences of social restrictions or disruption.[3;19;24]
- Case management for complex medically ill patients should be provided when health care workers experience problems with these patients in terms of increased use of health care facilities, communication problems, organisational problems, or tendencies of avoidance or denial. This can be provided in general practice, in an outpatient clinic or on a general health care ward.

- Case management will only be effective if it fits into existing programmes and structures. Developments such as the stepped care method and clinical pathways are structures that are mainly used for chronically ill patients (in disease management programmes). The development of clinical pathways for complex medically ill patients is still a virgin territory, and a tremendous challenge for future research.

RECOMMENDATIONS FOR FUTURE RESEARCH

- Future research should include the measurement of complexity in order to distinguish between chronically ill patients (in need of disease management) and complex medically ill patients (in need of case management). Homogeneous complex populations should be selected.
- Measurement of health risks and needs with the INTERMED should only be performed with patients who are in need of disease management or case management.
- Case management should be an intervention to supplement a disease management programme; a distinction can be made between patients in need of disease management and patients in need of case management.
- Case management programmes should be provided there where health care workers deal with complex medically ill patients and when patients and health care workers experience communication problems, organisational problems or tendencies of avoidance or denial.
- Future research should link up with already existing care programmes (so-called clinical pathways).
- Follow-up should be of adequate duration, since there are indications that case management programmes are only (cost-)effective in the long-term, and not in the shortterm[19]
- Patients (and their family) need to be more involved in the design of case management programmes research, so that the interventions and the resulting outcomes fulfil the needs and wishes of those who are the focus of all our efforts.

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9

Summary

Chapter 1. General introduction

In the general introduction developments in the organization of healthcare delivery, were first described and followed by an outline of the thesis. The objectives were explained and the various chapters were briefly summarized.

Chapter 2. Integrated care for complex patients

This chapter described a systematic approach, the INTERMED method, to identify the risks of complex patients and their related integral needs, and discussed its applicability in relation to the nursing process. The major problem with existing care models is that, due to the fragmentation of care, it cannot be tailored to cope with the growing number of patients with multi-morbidity or with their long-term care needs. The INTERMED method is presented as a decision-support system. Based on the study results we stated that appropriate assessment of health risks, resulting in co-ordinated care with effective communication, is vital for multi-morbid patients, and there should also be a shift in focus from disease-oriented care towards medically complex and integrated care.

Chapter 3. Reliability of the INTERMED

In this study, the inter-rater reliability of the INTERMED was assessed by calculating the agreement of two independent raters, based on the same information. Correlations between the total scores of the two raters ranged from 0.91-0.96. At item level, in 83% of the assessments there were no differences between the raters, in 16% there was a 1-point difference, and in 1% there was a 2-point difference. Based on a cut-off score of 20/21, a κ of 0.85 was found. We concluded that there was a high agreement between the two experienced raters, and that after sufficient training it is possible to score the INTERMED reliably.

Chapter 4. Case management for complex patients: a systematic review

In the systematic review we summarized the available literature on the effectiveness of post-discharge case management for complex patients in general health care. We searched MEDLINE, EMBASE, the Cochrane Controlled Trials

register and Cinahl for relevant publications, and identified 1638 articles, 10 of which met the inclusion criteria. The selection of the studies, the assessment of their methodological quality and the data-extraction were all carried out by two independent reviewers. The characteristics of the complex patients varied in the different studies. Although we defined our own criteria in the search for complex patients and case management programmes, there is still no widely accepted standard for the assessment of complexity.

There was considerable heterogeneity in the populations, interventions, duration of studies and outcomes, which made it impossible for us to perform a meta-analysis. We therefore decided to perform a best-evidence synthesis.

We found conflicting results, and we could therefore draw no firm conclusions. We found moderate evidence that case management has a positive effect on patient satisfaction, and we found strong evidence that case management has no significant effect on the number of visits to an emergency department. On the other outcomes (re-admission, days of hospitalization and quality of life) we found conflicting evidence. There was insufficient evidence that case management has a positive effect on a patient's functional status.

Chapter 5. Implementing interventions: effects on quality of life and length of stay

In this intervention study we investigated the effects of a psychiatric intervention on patients in a general medical ward, in terms of improving their quality of life and reducing the length of hospital stay. One-hundred-and-ninety-three patients participated in a controlled trial, in which the patients were screened with COMPRI and INTERMED. A consultation liaison nurse conducted the interventions, which mainly consisted of psychiatric interventions, but also included of referral to auxiliary services, the organization of weekly multidisciplinary meetings or the initiation of post-discharge care. Intervention patients were compared with historic controls with regard to quality of life and length of stay. An overall positive effect on quality of life was found ($p = 0.037$), but this disappeared after controlling for confounders ($p = 0.28$). A reduction in length of stay was found for one sub-group, namely elderly patients ($p = 0.006$), but for the sample as a whole no significant effect was found ($p = 0.72$).

Chapter 6. Effectiveness of post-discharge case management

In this randomized clinical trial, the effects of a nurse-led case management intervention (NHI) on the number of emergency re-admissions and the level of care utilization, quality of life and psychological functioning 24 weeks after discharge was compared with care as usual. One-hundred-and-forty-seven patients were randomized, 69 to the control group and 78 to the NHI group. Patients in the intervention group were visited at home by a nurse specialist. After assessment of the complexity of the patient's health status by means of the INTERMED, a treatment plan was formulated. The main interventions were: psychosocial support for the patient and relatives (e.g. structuring, supportive interventions); mediation between patient and medical specialists or allied health professionals, and referral; improvement of compliance with medication, physical exercises, and advice on diet, smoking and alcohol consumptions. Self-management was promoted, as well as keeping appointments with care-providers.

The main weakness of the study was that the intervention was based in a secondary care facility and that the case manager implemented the intervention in a primary care setting without the full commitment of the general practitioners and other primary health care workers. This is contrary to what was intended, i.e. to integrate this period of preventive care in routine primary care. We could not demonstrate that case management was an effective strategy for dealing with complex medically ill patients in primary health care. The intervention did not result in a reduction of emergency re-admissions (RR 1.30, CI 95% 0.64 - 2.58) or in a reduction of care utilization, or in an improvement in quality of life or in an improvement in psychological functioning. However, the study did demonstrate a trend towards a possible shift in the direction of home-care facilities and away from non-independent living accommodation. In conclusion: there is no evidence that NHI is more effective than standard care with regard to emergency re-admissions, care utilization, quality of life and psychological functioning.

Chapter 7. Cost-effectiveness of post-discharge case management

This economic evaluation was performed alongside the randomized controlled trial described in Chapter 6. We compared the nurse-led case management

intervention focusing on costs 24 weeks after discharge with care as usual. The economic evaluation was conducted from a health services perspective, and only direct costs were included in the evaluation. Indirect costs were not considered to be relevant, because most patients (over 75%) had no job, were retired, or worked for less than 60%. Data on health care utilization were collected from the patients by means of a specifically developed care diary and during three periods of four weeks (1-4 weeks, 9-12 weeks and 21-24 weeks). The data were linearly interpolated: imputed for periods of 5-9 and 13-21 weeks, based on the average costs of the periods before and after. Data on the use of medication were collected from the patient's pharmacist over the entire follow-up period of 24 weeks. There was a substantial difference in total costs between the NHI group and the control group (€ 4286, 95% CI -41 ; 8026), but this difference was not statistically significant. In conclusion: NHI is not a cost-effective intervention. We do not recommend the implementation of this intervention in populations that do not consist of severely vulnerable and complex patients.

Chapter 8. General discussion

Chapter 8 reflects on some of the main findings of the studies described in Chapters 2 to 7, and general aspects of developments in the co-ordination of care for complex medically ill patients are discussed. Finally, some recommendations are made for future research.

10

Samenvatting (Dutch Summary)

In deze Nederlandse samenvatting wordt het proefschrift ' Coördinatie van zorg voor complexe patiënten' beschreven voor diegenen die geen wetenschappelijke of medische achtergrond hebben.

Hoofdstuk 1. Inleiding

In de inleiding wordt uitgelegd wat de achtergrond is van dit proefschrift en hoe wij tot de verschillende onderzoeken zijn gekomen.

Een belangrijke ontwikkeling in de gezondheidszorg is de vooruitgang in de medische technologie. Hierdoor gebeurt het steeds vaker dat voor ziekten die voorheen dodelijk waren nu behandelingen beschikbaar zijn (denk aan HIV of verschillende vormen van kanker). Het gevolg hiervan is dat mensen langer blijven leven. Mensen worden niet alleen ouder, ze hebben ook vaker één of meer chronische ziekten. We noemen dit multi-morbiditeit. Deze multi-morbiditeit geeft binnen de huidige organisatie van zorg problemen. Met name wanneer patiënten naast lichamelijke ziekten (bijvoorbeeld suikerziekte en hartproblemen) ook psychiatrische ziekten hebben (bijvoorbeeld een depressie of alcoholverslaving). Het afstemmen van zorg voor deze complexe patiënten blijkt bijzonder ingewikkeld. Het lijkt voor patiënten, maar ook voor hulpverleners soms een doolhof van mogelijkheden en onmogelijkheden. Communicatie- en organisatieproblemen komen geregeld voor omdat deze complexe patiënten niet 'passen' in de huidige organisatie van de gezondheidszorg.

In deze complexe patiënten nu zijn wij geïnteresseerd, en dan vooral hoe we de zorg voor deze patiënten kunnen verbeteren in de breedste zin van het woord.

Om te beginnen wilden we deze patiënten, wanneer ze bij een hulpverlener komen of opgenomen worden in een ziekenhuis, op een 'gemakkelijke' en niet al te tijdrovende manier kunnen herkennen. De INTERMED is een instrument waarbij middels een interview patiënten 'gescoord' kunnen worden op de mate van complexiteit.

We hebben onderzocht of dit een betrouwbaar instrument is, en in hoeverre dit instrument goed te gebruiken is in de dagelijkse praktijk. Voorts zijn we in de medische literatuur op zoek gegaan naar onderzoeken over zorgcoördinatie, en in hoeverre zorgcoördinatie een positief effect had op de kwaliteit van zorg voor patiënten.

Tot slot hebben we onderzocht wat er gebeurt als een zorgcoördinator (een verpleegkundig specialist) wordt toevoegt aan een behandelteam. Zal voor deze complexe patiënten de opnameduur in het ziekenhuis verminderen? Hebben deze patiënten minder heropnames? Voelen ze zich beter? En kost het de maatschappij minder geld als de zorg door een verpleegkundig specialist wordt gecoördineerd?

Hoofdstuk 2. Geïntegreerde zorg voor complexe patiënten.

In dit hoofdstuk wordt, aan de hand van een patiëntencasus, beschreven hoe je een complexe patiënt in kaart kunt brengen en welke specifieke zorg er nodig is voor dergelijke patiënten. We maken hierbij gebruik van de INTERMED. Dit is een methodiek die uitgaat van de biopsychosociale benadering voor de diagnosestelling en behandeling van patiënten. De gezondheidszorgbehoeften van patiënten worden middels een interview van 20 minuten met de patiënt geordend op vier domeinen: biologisch, psychologisch, sociaal en voor wat betreft de relatie met de gezondheidszorg. Deze domeinen worden gescoord op een tijdsas: voorgeschiedenis en huidige toestand. Bovendien wordt voor elk domein de prognose gegeven. Hoe hoger de score, hoe complexer de patiënt. Aan de hand van het scoreprofiel wordt bepaald of de patiënt voldoende heeft aan standaard zorg, enige vorm van coördinatie van zorg nodig heeft, of dat er sprake is van dusdanige complexiteit dat 'complexiteits-zorg' ofwel case management geïndiceerd is.

Hoofdstuk 3. Betrouwbaarheid van de INTERMED

Dit hoofdstuk beschrijft de betrouwbaarheid van de INTERMED. Door het afnemen van een speciaal ontworpen interview (INTERMED) kan een patiënt gescoord worden op de mate van complexiteit. Van belang is dat de ene hulpverlener op dezelfde manier scoort als de andere hulpverlener. Met andere woorden: als men twee hulpverleners hetzelfde interview laat scoren moeten ze, onafhankelijk van elkaar, op een zelfde eindscore komen. Dit wordt de betrouwbaarheid van een instrument genoemd. In dit onderzoek hebben 2 hulpverleners beurtelings, in aanwezigheid van de ander, een INTERMED interview afgenomen bij 41 patiënten. Aansluitend hebben ze onafhankelijk van

elkaar de INTERMED gescoord. Na analyse van de gegevens bleek dat beide hulpverleners in hoge mate hetzelfde scoorden, waaruit wij concludeerden dat de INTERMED een betrouwbaar instrument is.

Hoofdstuk 4. Zorgcoördinatie voor complexe patiënten; een systematische beoordeling van de literatuur

In dit onderzoek zijn we op zoek gegaan naar gepubliceerde wetenschappelijke onderzoeken over zorgcoördinatie voor complexe patiënten. Is er overtuigend bewijs dat het toevoegen van een zorgcoördinator ook betere zorg voor de patiënt betekent? Eerst hebben we via een brede zoekopdracht op wetenschappelijke webpagina's relevante onderzoekartikelen geïdentificeerd. Vervolgens hebben twee onafhankelijke onderzoekers bepaald of deze artikelen ook aan een meer specifiek zoekprofiel voldeden. Van de 1638 mogelijk relevante artikelen bleken er uiteindelijk 10 aan ons zoekprofiel te voldoen. Aansluitend werden deze 10 artikelen door twee onafhankelijke onderzoekers beoordeeld op kwaliteit, en kregen ze een label lage dan wel hoge kwaliteit. Vervolgens keken we naar de resultaten van de verschillende onderzoeken (bijvoorbeeld aantal heropnames of hoe patiënten de kwaliteit van leven ervoeren). Na analyse van de verschillende uitkomsten, rekening houdend met de kwaliteit van de onderzoeken, kwamen we tot de conclusie dat er op dit moment geen hard bewijs is om te stellen dat zorgcoördinatie leidt tot betere zorg. Er is zwak bewijs dat patiënten die zorgcoördinatie kregen meer tevreden zijn over de verkregen zorg in vergelijking met patiënten die geen zorgcoördinator toegewezen kregen.

Hoofdstuk 5. Zorgcoördinatie: effect op kwaliteit van leven en opname duur.

Voor deze studie werden 193 patiënten geselecteerd op de afdeling inwendige geneeskunde. Van al deze patiënten werd we een korte screeningslijst (de COMPRI = COmplexiteit PRedictie Instrument) bij de behandelende arts en verpleegkundige afgenomen (score 0 tot 20) afgenomen, en alleen bij een score van 6 of meer (= grenswaarde) werd er ook een INTERMED interview afgenomen. Indien de score van de INTERMED 21 of meer was werd voor deze subgroep (de interventiegroep) specifieke zorg georganiseerd door een

zorgcoördinator. De zorgcoördinator verwees patiënten bijvoorbeeld naar andere hulpverleners, organiseerde multidisciplinair overleg of organiseerde nazorg. Bij ontslag vulde de patiënt een 'kwaliteit van leven' vragenlijst in en registreerden we hoe lang de patiënt was opgenomen.

We vergeleken de resultaten (opnameduur en kwaliteit van leven) van de interventiegroep met de patiëntengroep uit een eerder uitgevoerd onderzoek (de controlegroep, zonder zorgcoördinator). We zagen dat de interventiegroep (de patiënten die zorgcoördinatie hadden gekregen) een significant betere kwaliteit van leven rapporteerden in vergelijking met de controlegroep. Echter, de omstandigheden op de afdeling waren in de loop van de tijd veranderd, en na statistische correctie voor deze veranderde omstandigheden bleek de gerapporteerde kwaliteit van leven gelijk. Bij de opnameduur zagen we aanvankelijk dat deze voor beide groepen gelijk was. Bij nadere analyse bleek dat in de interventiegroep meer oudere patiënten (65+) zaten dan in de controlegroep. Aansluitend is de groep 65+ patiënten apart geanalyseerd en toen bleek dat de opnameduur voor de interventiegroep significant korter was in vergelijking tot de controlegroep, ook na controle voor veranderde omstandigheden.

Hoofdstuk 6. Effectiviteit van zorgcoördinatie bij niet-opgenomen patiënten

In dit onderzoek hebben we gekeken naar het effect van zorgcoördinatie bij patiënten die net ontslagen waren uit het ziekenhuis. Onze veronderstelling was dat patiënten die zorgcoördinatie krijgen minder vaak worden heropgenomen, een betere kwaliteit van leven ervaren en zich psychisch beter voelen ten opzichte van patiënten die geen zorgcoördinatie krijgen.

Wanneer een patiënt met ontslag ging uit het VU medisch centrum (afdeling cardiologie, interne geneeskunde of longziekten) vroegen we hem of haar mee te doen met het onderzoek. Door middel van loting kwam een patiënt in de interventiegroep of in de controlegroep terecht. De patiënten in de interventiegroep kregen een zorgcoördinator toegewezen die daags na ontslag op huisbezoek kwam. Middels de INTERMED werd de complexiteit van de patiënt in kaart gebracht en werd een zorgplan gemaakt in samenspraak met een medische supervisor, de huisarts, de patiënt en eventuele andere betrokken hulpverleners. Afhankelijk van de complexiteit had de zorgcoördinator

regelmatig dan wel incidenteel, doch minimaal eens in de twee maanden, contact met de patiënt. De zorgcoördinatie bestond uit psychosociale ondersteuning, bemiddeling tussen patiënt en hulpverleners in geval van een verstoorde relatie, ondersteuning bij het minderen van alcoholgebruik of roken, uitleg van medicatiegebruik, ondersteuning bij het naleven van leefregels en medicatievoorschrift en bevordering van zelfredzaamheid. Na een half jaar stopte de interventie. De controlegroep kreeg geen zorgcoördinator, maar zorg zoals voorheen gebruikelijk was. Ook bij hen werd de kwaliteit van leven, het psychisch functioneren, het zorggebruik, waaronder heropnames gemeten. Bij analyse van de gegevens bleek dat onze interventie geen enkel significant effect had: niet op het aantal heropnames, niet op het psychologisch functioneren en niet op de kwaliteit van leven. We zagen wel een trend dat patiënten in de interventiegroep vaker zelfstandig thuis konden blijven wonen in vergelijking met de controlegroep.

Hoofdstuk 7. Kosteneffectiviteit van zorgcoördinatie bij niet opgenomen patiënten

Dit hoofdstuk is speciaal gewijd aan de kosteneffectiviteit. Het kostenonderzoek 'liep mee' met het onderzoek beschreven in hoofdstuk 6. Patiënten die meededen aan dit onderzoek kregen gedurende de onderzoeksperiode 3 maal een zorgdagboek thuis gestuurd. Hierin hielden zij, gedurende 4 weken, bij welke zorg zij ontvingen (bijvoorbeeld 1 x naar de huisarts geweest, 3 uur thuiszorg, 5 dagen opgenomen in het ziekenhuis etc). Daarnaast had de patiënt toestemming gegeven aan het onderzoeksteam om de medicatiegegevens op te vragen bij de apotheek. De zorg rekenden we om in kosten, en ook nu weer vergeleken we de interventiegroep met de controlegroep. Het sloot aan bij de resultaten uit hoofdstuk 6. We konden geen significant verschil in kosten aantonen, sterker nog: het leek erop dat de zorg voor de interventiegroep meer geld kostte dan de zorg voor de controlegroep. Een mogelijke verklaring hiervoor is dat de zorgcoördinator patiënten beter de weg wees binnen de gezondheidszorgorganisatie (bijvoorbeeld uitlegde aan de patiënt hoe zij of hij thuiszorg kon aanvragen), waardoor de patiënten in de interventiegroep meer zorg gingen consumeren dan de patiënten in de controlegroep. Het lijkt er op, maar we hebben dit niet onderzocht, dat patiënten in de interventiegroep erg

tevreden waren over de zorgcoördinatie. Maar meer tevredenheid leidt niet automatisch tot goedkopere zorg, misschien wel tot het tegendeel.

Hoofdstuk 8. Algemene discussie

In de algemene discussie kijk ik terug op de verschillende onderzoeken en stel ik mijzelf enkele kritische vragen over het proefschrift in zijn geheel. Bijvoorbeeld, hebben we de juiste patiënten in ons onderzoek betrokken; hebben we de interventies wel juist uitgevoerd? etc. Vervolgens ga ik nog in op de relevantie van dit proefschrift voor de gezondheidszorg en tot slot geef ik enkele aanbevelingen voor vervolgonderzoek.

Dank

Jawel, een uitgebreid dankwoord, met veel overtreffende trappen, niet strak als een artikel maar met veel opsmuk en overbodige woorden. Daar gaat ie:

Allereerst een dankwoord voor de **patiënten** die meededen aan de verschillende onderzoeken: velen heb ik geïnterviewd. Zelden was er een patiënt die mij niet te woord wilde staan. In het bijzonder de patiënten die mij toestonden om op huisbezoek te mogen komen ben ik erkentelijk. Ze gaven me letterlijk en figuurlijk een kijkje in hun keuken. Het heeft mijn inzicht in complexiteit van zorg handen en voeten gegeven.

Wim Stalman, mijn promotor. Verbindende factor tussen een groots creatief brein (Frits) en een subliem epidemioloog (Rien). Nimmer heb ik je met een slecht humeur getroffen. Je hebt me geleerd systematisch naar problemen te kijken en om mooie artikelen te schrijven: 'iets meer ritme in het artikel', 'wat meer cadans'. En als er een artikel was afgewezen en ik het reviewers commentaar doorstuurde (inclusief mijn eigen primaire reactie) was het bijna een genoegen om je opbeurende reply terug te krijgen; 'Beste Corine, dit is nu eenmaal het lot van een begenadigde onderzoeker'!

Rien de Vos, epidemiologisch wonder. Je bracht me de fijne kneepjes van het onderzoeken bij. Je paste werkelijk perfect in de promotiegroep. Als een ander met veel enthousiasme iets aan het onderzoek wilde toevoegen kon je droogjes reageren dat je daar 'vanuit epidemiologisch oogpunt niet zo gelukkig mee was'. Einde verhaal. Het is aan jou te danken dat de onderzoeken en de daaruit voortkomende artikelen zo strak in elkaar zitten.

Frits Huyse, bij jou is het eigenlijk allemaal begonnen. Ik ben diep onder de indruk van je gedrevenheid en creativiteit. Mister Integrated Care himself, het was een grote eer om jou als co-promotor te hebben. Je kennis over dit onderwerp is onuitputtelijk. Je hebt me heel veel geleerd. Dank hiervoor.

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Marga en Liesbeth, door een drukfout is de tekst hier terecht gekomen in plaats van op pagina 2, maar hier is ie dan:

'Voor Liesbeth en Marga, zonder jullie had ik dit niet gekund'!

Peter de Jonge, tja, misschien was zonder jouw bijdrage er nooit een promotie geweest, het mag toch effe gezegd worden. Je hebt onderzoek 'smoel' gegeven binnen de P.C.D., en daar heb ik de zoete vruchten van mogen plukken. Het was te begrijpen maar o zo spijtig dat je naar Groningen vertrok (als meest ambitieuze van ons tweeën). Ik ben blij dat je altijd betrokken bent gebleven bij mijn promotie, en dat ik je altijd kon mailen / bellen voor advies.
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Tot slot, **Pierre Delfgaauw**, wees gerust, ik zal het beschaafd houden. Met de komst van onze Melle heb je een jaar genoten van een sabbatical. Deels omdat je graag voor onze Melle wilde zorgen, maar ook omdat je mij de gelegenheid wilde geven mijn onderzoek goed te kunnen afronden. Dank op mijn blote knietjes en nog veel meer!

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Curriculum vitae &
list of publications

1967	Born in Eindhoven
1985 - 1989	Student School of Nursing Amsterdam
1996 – 1997	Student Clinical Nurse Specialist, Nijmegen
2000 – 2001	Student Evidence Based Practice, Amsterdam
2002 – 2006	PhD student, Consultation and Liaison Psychiatry Service, VU University medical centre Amsterdam
1998 – now	Nurse Specialist, Consultation and Liaison Psychiatry Service, VU University medical centre Amsterdam
2006 – now	Researcher, Department of General Practice, EMGO institute, VU University medical centre Amsterdam

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